Engineering News, December 28, 1961

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No. 13 December 28, 1961

ENGINEERING NEWS

THE NEWSPAPER OF INDUSTRY • A HEYWOOD PUBLICATION

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As a year of tight finance closes, Engineering News reporters ask industrialists about their prospects

INDUSTRIES LOOK TO 1962 FOR GREATER PROSPERITY

Only steel is not confident of New Year opportunities

IN three days it will be 1962—and the new year may well prove to be one of hustle, bustle and improving economy. Industry expects the world to be divided into three major trading blocks: the East, the West and the Common Market.

Against this background, Engineering News has made end - of - the - year inquiries among Britain's industrialists . . . and has found a vigorous optimism.

Sir Roy Dobson, vice-chairman and managing director of the Hawker Siddeley Group said rationalisation measures will become fully effective in mid-1962 and the Hawker Siddeley group would then be working at the highest efficiency achieved since the big aviation mergers.

"We have good orders for the Avro 748, the Vulcan bomber, the Trident jet-liner, the Buccaneer low level strike aircraft, and the de Havilland (Canada) Caribou. We lead the world in single-engined VTOL development with the Hawker 1127."

Engine orders

"On the industrial side the Brush group will be working to full capacity throughout 1962. Our recently integrated Mirrlees and National Engine factories are fully engaged with increasing engine orders."

Mr. G. Rainford, company secretary, of Clarkson (Engineers) Co., Nuneaton, said "This year has been the best so far and while stiffer competition lies ahead the company anticipates that 1962 will prove to be one of increased success.

"We shall continue to open subsidiaries abroad. At the moment exports are 40 per cent of turnover and we expect an upward trend."

An executive at Honeywell Controls: "British industry is now likely to accept an increase in the use of data logging and scanning techniques.

Future in computers

"Interest is also growing in the use of computers to link business data with factory output. Companies making automation systems can expect to see a sales increase of about 20 per cent, regardless of the economic climate."

At the United Steel Co., Mr. E. Sara, assistant general sales manager, was less confident: "Steel output is well down due to large stocks. This means that consumers may not reorder until towards the end of 1962.

"The future depends very much on increased productivity, and the fortunes of the motor industry have a particular bearing on steel requirements."

Mr. B. B. Swann, sales manager of the computer depart-

● Back page, col. 6

PORTABLE FAST-NEUTRON GENERATOR WORKS OFF NORMAL ELECTRICITY SUPPLY

A PORTABLE fast-neutron generator which will work off normal electricity supply and produce radioactive isotopes on the spot has been developed by Services Electronics Research Laboratories of Baldock.

It is to be manufactured and marketed under licence by the Elliott-Automation Group.

The heart of this new neutron generator is a K-type Neutron source tube only 8in. long and 1½in. in diameter. With the 150,000-volt pulse transformer, it is housed in a shielded case with a volume of about ½cu.ft.

TITANIUM TARGET

The entire equipment occupies less than 4cu.ft. The generator produces a stream of neutrons with an energy of 14.3 MeV pulses of 20 microseconds duration.

Inside the tube, an electrical accelerating field extracts deuterium ions from a cold cathode, Penning-type ion source, maintained at a pressure of 20 microns.

These are made to bombard a tritium-loaded titanium target by applying to it a negative voltage pulse of 150kV relative to the cathode of the ion source.

Because the bombarding deuterium ions are absorbed by the target, a titanium deuteride dispenser is attached to the tube to maintain deuterium pressure, thus ensuring a stable ion source.

The generator makes possible the application of isotopes with very short half-lives. This permits the industrial and medical use of nucleonic techniques without many of the risks previously incurred.

WIDE APPLICATIONS

Hospitals could be equipped with their own neutron source and save precious time in obtaining isotopes.

It could be used to detonate a nuclear device by supplying additional neutrons to initiate chain reaction in a sub-critical mass of nuclear material. This would provide a safe "trigger", since no reaction could start until the generator was switched on.

Several industries have expressed interest, including steel, chemical, plastics, petroleum and electrical engineering concerns. The tube is made under licence from the UKAEA and the complete equipment is to be exhibited at the Physical Society's Exhibition next month.

Automatic loader unit

AN automatic loader unit for gear shaving or gear tooth honing machines in fully automated lines is being marketed by National Broach & Machine Co., of Detroit, USA. Agents in Britain are Wickman of Coventry.

This Red Ring device performs both loading and gauging operations and eliminates damage caused to cutters or honing tools by oversize gears.

Gears from a conveyor line are fed into the input magazine where an air cylinder operated escapement mechanism releases one gear per machine cycle.

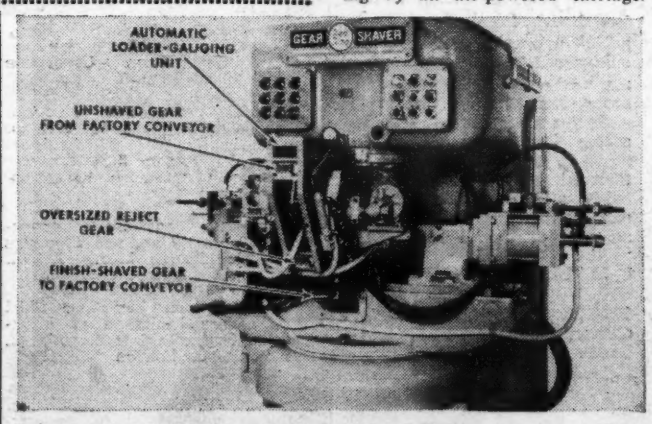
Automatic gauging

The gear passes between the lower master gear, which is motor driven, and the upper master gauging gear.

Deflection of the upper gear beyond a pre-set centre distance indicates oversize, and passes the rejected gear through a chute to the front of the loader.

When a gear is rejected, the escapement mechanism is automatically reactuated and feeds in a new gear.

If size specification is met, the gear rolls in to the loading point where it is advanced for machining by an air-powered carriage.



This automatic loader unit for both gear shaving and gear tooth honing machines on fully automated lines is now available in Britain.

DIVISIONS STRUCTURE FOR IEE

CHANGES in the organisation of the Institution of Electrical Engineers intended to give greater flexibility will come into effect on October 1.

From that date the four existing specialised sections of the institution will be dissolved, to be replaced by three divisions: electronics, power, and science and general.

Members have been invited to register for one or more of these divisions and they will also be split into 28 professional groups.

The list of professional groups will be subject to modification at short notice so that new subjects can be introduced.

Width check for hot steel

TO measure the width of hot steel plate during rolling, a device has been developed jointly by the Metal Industries Division and the Data Processing and Control Systems Division of English Electric.

It consists of two units, measuring head and counter and display unit.

The head is mounted on a beam in front of a reversing mill stand 16 to 20ft. above the plate being measured.

This ensures an accuracy of ±½in. at temperatures between 1,000 and 1,300°C.

At a height of 20ft. a plate 12ft. wide can be checked; increasing this distance reduces the accuracy.

Infra-red head

The measuring head consists of an infra-red telescope, pivoted so that it can scan the axis of the plate, and—at its focal point—a photo transistor.

A drive motor swings the telescope to scan the plate width. It also drives a pulsing disc which produces electrical impulses for every 0.1in. movement of the telescope's vision across the plate. Disc holes are supplemented by compensating ones for different plate thicknesses.

A standard cubicle houses the counter and display unit which can be sited near the reversing mill stand.

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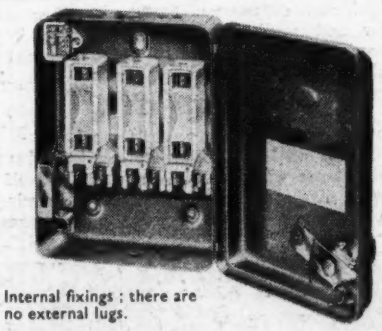
The "MEMREX-EXEL" Range of Switchgear
Complies with B.S. 2510:1954
Ratings: Switches 10, 15, 30 amps. Switchfuses: 10, 15, 30, 60 amps., 500 volts

- Fuses are of the "Kantark-Exel" pattern, the bases of which will accept semi-enclosed rewirable or H.R.C. fuse carriers.
- Pressed steel cases. Rust proofed, finished grey stove enamel.
- Three knockouts provided at top and bottom and one at left hand side.
- H.R.C. Carriers can be supplied at no extra charge to accommodate cartridge fuse-links to B.S.88: 1952 Appendix J. Dimensions.



Internal fixings; there are no external lugs.

Rewirable fuses comply with B.S.3036: 1958.

- Detachable switch bar to facilitate wiring.
- Screw-on porcelain safety shields serve also as arc baffles.
- Complies with I.E.E. Regulations (13th Edition) and the Electricity (Factories Act) Regulations.
- Front operating Switch handles.

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The greatest safeguard an installation can have.
WRITE FOR CATALOGUE No. 450
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REDDINGS LANE, TYSELEY, BIRMINGHAM 11

SIR WILLIAM RESIGNS AS MANAGING DIRECTOR OF BICC

SIR WILLIAM McFADZEAN, chairman of British Insulated Callender's Cables is relinquishing his office of managing director while remaining executive chairman.

This decision has been made in order that Sir William shall be free to concentrate on overall policy and the national and international aspects of group affairs.

Mr. R. M. Fairfield and **Mr. W. C. Handley,** at present assistant managing directors, will become joint managing directors.

Mr. H. F. Akehurst, at present assistant managing director is to become executive director (Export) and **Mr. W. Fraser,** who is a director will become executive director (Overseas Companies).

These appointments take effect from January 1.

Mr. R. M. Fairfield

Sir William McFadzean

PEOPLE in the NEWS

Mr. J. Buckman, formerly project development manager of the Standard Motor Co. has been appointed general manager of the Bridgwater Machine Co. at Co. Durham.

This subsidiary of the American Brake Shoe Company of New York, is now being equipped for the manufacture of tyre moulds for the U.K. and Europe.

☆

Mr. A. L. Ross has been named executive vice-president of the Farringdon Manufacturing Co. He succeeds Mr. W. M. Tetrick whose resignation was accepted this week.

Mr. Ross will direct the activities of the company and its ten subsidiaries pending the appointment of a new president.

Mr. Tetrick has been president of Farringdon since November, 1958. Mr. Ross joined the company as senior vice-president in January, 1961.

Ruston & Hornsby of Lincoln announce that **Mr. C. T. Alderson,** who since the beginning of this year has been deputy managing director, has become managing director.

He succeeds Mr. V. R. Prehn who retires at the end of December.

Mr. Alderson first joined Ruston's in 1932 and after war work, rejoined the company becoming contracts manager, assistant managing director, and then deputy managing director.

☆

British Aircraft Corporation announces the appointment of **Sir George Edwards** as chairman of subsidiaries British Aircraft, English Electric Aviation, and Vickers-Armstrong (Aircraft). He was formerly managing director.

The retiring chairmen, who also retire from the boards of these three companies, are **Sir Reginald Verdon-Smith, Mr. H. G. Nelson,** and **Major-General Sir Charles Dunphie.** These remain members of the board of British Aircraft, Mr. Nelson and Major-General Sir Charles Dunphie being deputy chairmen.

These changes take effect as from January 1, 1962.

Sir George Edwards is already chairman of Hunting Aircraft, the corporation's fourth subsidiary.

Mr. J. F. Harper is promoted to managing director of that company. He was formerly general manager.

☆

Mr. J. A. Needham has succeeded **Mr. F. Nattrass** as technical sales engineer of the Soils Compaction Division of Armstrong Whitworth (Metal Industries).

Mr. Needham served as an apprentice engineer with the Mirrlees Group and was subsequently works manager of a company manufacturing mechanical handling equipment. He worked for some years in the earthmoving equipment industry before joining Armstrong Whitworth in 1961.

Mr. J. A. Needham

☆

George Kent announce the following appointments to their sales staff:

Mr. K. A. Steele, formerly assistant industry sales manager of the Metallurgical Division, has been appointed representative for the outer London area.

Mr. J. C. Barrett, who has been appointed area representative for the Surrey, Kent and Sussex districts, was previously a member of the nuclear division of sales contracts departments.

In preparation for the retirement in a few months' time of **Mr. H. Moren-Brown,** who has represented the company in the Birmingham area for 30 years, two new representatives have been appointed. They are **Mr. G. H. C. Lynn** and **Mr. J. E. Brown.**

Mr. D. Harvey is now representative for the Manchester area which includes the eastern halves of Lancashire and Cheshire.

With the recent retirement of **Mr. J. S. Thompson,** representative in Scotland for 23 years, his responsibilities have been separated into two divisions, each with its own representative.

Mr. R. Barclay, previously assistant to Mr. Thompson, will now operate in the western half of Scotland.

Mr. Millar Taylor, formerly attached to the technical division of the service department, has taken over the eastern half of the territory.

Mr. W. C. Handley

Mr. A. Derbyshire has been appointed managing director of Controlled Heat and Air, member company of the Incandescent Group, following the death of Mr. R. D. MacMillan.

Mr. Derbyshire joined the company in 1939, became works manager and in 1945 was appointed a director. He has been largely involved with technical sales and in building up business overseas.

"This job calls for a responsible man, well that's me, everything that went wrong at my last job I was responsible !!!"

☆

The Minister for Science has appointed **Sir Harry Melville,** secretary of the department of Scientific and Industrial Research, to be a member of the Research Council.

In making this appointment, Lord Hailsham gives recognition to Sir Harry's "notable services to D.S.I.R.". The appointment is personal to Sir Harry and does not mean that future secretaries will automatically become members of the Research Council.

Hitherto, Sir Harry Melville, as secretary and head of the department, has served the Research Council in that capacity without being a full member.

☆

Boulton and Paul announce that **Mr. R. Taylor** died recently at his home.

Mr. Taylor began his career in structural engineering as an apprentice with Redpath Brown and later moved to Banister Walton and Co. His next appointment was as managing director of C. J. Cook Structural Engineers of Openshaw.

Mr. Taylor's first appointment with Boulton and Paul was as manager of the Structural Engineering department. He retired in 1958 because of ill-health. He became a director in 1935 and was appointed joint managing director in 1947.

Letters to the Editor

LET'S CALL ENGINEERS 'MAGISTER'

Then this title should be protected by law

MR. RICKARD (December 7) asks "What is an engineer?" The answer, as proved by common usage, is anyone wishing to be so described.

The senior professional institutions attempt to distinguish their qualified members by such terms as (in my own case) chartered mechanical engineer. They, and the Engineers' Guild, recommend the employment of these terms by those entitled to use them.

The weakness of the titles is that they are lengthy and contain the word "engineer", which has become practically meaningless.

Your correspondent compares the profession of engineering with law and medicine. There are significant differences. Status in law and medicine arises partly from risks taken and seen to be taken in direct contact with members of the public.

The professional engineer is invariably one step removed from the opportunity of direct contact with those who benefit from his work. An exception is the consultant engineer, who is nevertheless careful to emphasise the "consultant" rather than the "engineer" on social occasions.

I spent months seeking an alternative word to "engineer" for the qualified professional, and discussed the point at length with colleagues and friends. I discovered that the majority were embarrassed at the thought of arguing their own case for recognition of status, through such reticence is not evident in other professions.

After studying a number of reference works, I came to the conclusion that **Magister** would be as good a prefix as any. If we can get the main professional bodies to agree to that, and get it protected by law, this will be the first step towards public understanding that we have reached a special level of competence in a field of importance to society.

S. W. GREENWOOD,
MEng, AMIMechE, AFRAeS.
Lexham Gardens Hotel,
112-116 Lexham Gardens,
Kensington,
London, W.8.

STATUS IS A SIGN OF RESPECT

MR. J. K. RICKARD (December 7) requires a definition of an Engineer.

Surely such status does not depend on definitions, but on the view of the general public. Mr. Rickard should be proud to refer to himself as a chartered engineer, and therefore as a professional engineer, and leave the term "engineer" to those 2,000,000 who demand tea breaks.

The professional institutes have defined the term engineer as appropriate to their relative fields, and professional engineers should act so as to gain for themselves the respect of the public.

Status follows respect, not definitions.

M. C. DUNCAN,
GIMechE.
37 Station Road,
Kingswood,
Bristol.

FOLLOW CANADA!

FURTHER to J. K. Rickard's letter (December 7), I would like to add my comments.

In England, until registration is made compulsory by law anyone, even without any qualifications, can call himself an Engineer. If, however, the individual is an MIEE, or an AMIEE, he can be defined as a "chartered electrical engineer".

In Canada, registration is compulsory by law, where an engineer, as a professional man, is defined as a "professional engineer" (PEng). Hence, the misuse of the designation engineer, if not qualified by registration, will result in a heavy fine.

V. WOODCOCK,
AMCT, AMIEE, PEng.
21 Bull Bridge Lane,
Aintree Village,
Liverpool, 10.

'What a shame!'

I SUGGEST that one of the earliest steps to take would be to ask all newspaper and magazine editors not to use "engineer" in any mass descriptive sense for some time, (say five years).

At the same time the engineering institutions should be asked to consider this subject in their present deliberations.

My wife mentioned to someone that her husband "was only an engineer". The reply was: "What a shame!"

MALCOLM L. MURDOCH
AMIMechE.
170 Preston Road,
Chorley,
Lancs.

THE EDITOR

. . . welcomes letters on any subject. Post them to Engineering News, Drury House, Russell Street, London, W.C.2.

THE ENGINEER'S GUILD SAYS . . .

ENGINEERING today is both a profession and an industry, and the word 'engineer' is for this reason used to describe a wide range of persons engaged in the industry, from the mechanic to the fully qualified member of the profession.

Such usage, although often exasperating to the professional engineer, is of very long standing; it found expression in 1851 in the title of the Amalgamated Society of Engineers, now better known as the A.E.U., and in the Economist of January 10, 1852 there appeared the statement that "there is nothing to prevent carpenters, smiths, and even common labourers from becoming, in a very short time, very respectable engineers."

The indiscriminate use of the term 'engineer' is a disability from which other professions such as medicine, law and architecture are free, but it is no more insuperable than is the use of the term 'soldier' to describe both the colonel and the private.

The difference lies in the present degree of public understanding of the army and of engineering. When the public has been made aware that the engineering works which it sees and uses every day are the product of the design and planning of professional engineers, the first step will have been taken towards that public recognition of their work which members of the profession are conscious they lack today.

The task of replacing ignorance and apathy by understanding and respect has already been begun by the Engineers' Guild, as the professional association for members of the engineering profession, but it requires an expenditure of time and money which can only be provided in proportion to the resources available.

J. G. ORR, M.A.,
Secretary.
The Engineers' Guild,
London, WC1.

Coming EVENTS

THIS WEEK

December 30-January 6
International Racing Car Show, Old and New Horticultural Halls, Westminster, London.

January 3-13, 1962
Eighth National Boat Show. Earls Court, London.

January 8-12, 1962
International Heat Transfer Conference, Institution of Mechanical Engineers. Westminster London.

January 9-11
Eighth National Symposium on Reliability and Quality Control. Washington, D.C.

January 15-19
Symposium of Optical Character Recognition. Washington, D.C.

January 15-19
Exhibition of Scientific Instruments and Apparatus, Old and New Horticultural Halls, Westminster, London.

January 22-25
National Plant Maintenance and Engineering Show Convention Hall, Philadelphia.

January 24-27
Canada Farm and Industrial Equipment Trade Show. Toronto, Canada.

January 27-February 2
Electrical Engineering Exposition. New York.

February 5-9
Symposium on Electroforming-Applications, Uses, and Properties of Electroformed Metals, ASTM, Dallas, Texas.

February 7
Symposium on Two-Phase Fluid Flow. The Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London.

February 16-24
International Inventions and Commercial Development Exhibition. Central Hall, Westminster, London.

February 26-28
Joint I.E.E./R.Ae.S. Conference. The importance of electricity in the control of aircraft. London.

March 9-18
Eleventh International Inventors' Exhibition. Brussels.

March 13-15
Conference on Testing for Performance. The Plastics Institute, London.

March 15
Symposium on the Computer and Mechanical Engineer. Institute of Mechanical Engineers, London.

March 20-24
Eleventh Electrical Engineers Exhibition. Earls Court, London.

March 28-29
Third Symposium on Engineering Aspects of Magnetohydrodynamics. University of Rochester, New York.

April 9-13
International Pipes, Pipelines, Pumps & Valves Exhibition and Conference. Earls Court. London.

April 10-14
Second International Conference on Stress Analysis. Paris.

April 11
Symposium on Modern Rolling Mill Practice Sheffield University.

April 13-19
International Refrigeration Fair, Olympia, London.

April 16-18
Second International Flight test instrumentation Symposium. College of Aeronautics, Cranfield, Bucks.

April 21-October 21
World Fair Seattle, U.S.A.

April 30-May 3
Design Engineering Conference, Chicago.

April 30-May 4
International Compressed Air and Hydraulics Exhibition and Conference, Olympia, London.

April 30-May 5
Production Exhibition, Olympia, London.

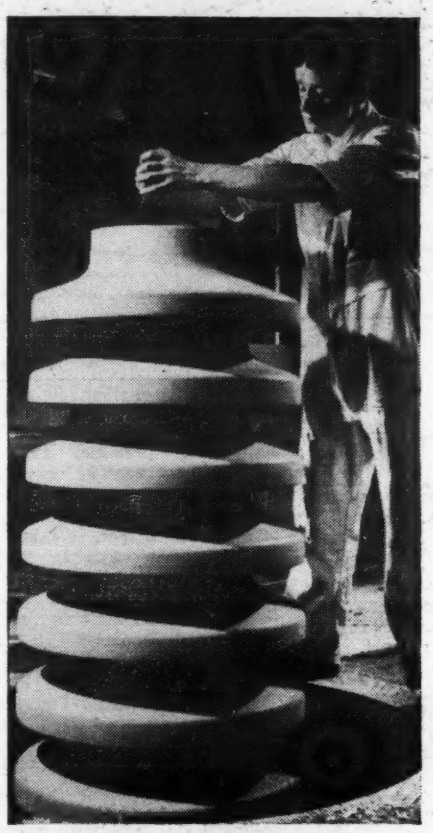
May 1-4
Contractors Plant Exhibition, Swinton, Manchester.

PROGRESS IN PICTURES

Photographs by

Walter Nurnberg

Work starts on bushings for Britain's 400kV supergrid



At the Bushing and Ceramics division of English Electric, Accrington "stickers up" build the "jolleyed" sections of an insulator into one unit by bonding with clay "slip."

AT the Accrington works of English Electric the task of producing high quality insulators for the new C.E.G.B. 400kV supergrid is well under way.

The stalk is made from a copper bar, machined and sandblasted, then threaded and silver plated to a tight specification.

By the use of heated rollers, varnished paper is rolled on. Condenser foils are fed into the rolling machine at pre-determined intervals related to the electrical requirements.

By grading the length and diameter of the metal foils as set in the paper dielectric, equal capacitance of the condenser elements is ensured.

Curing and bonding is then completed by oven heating.

At this stage the bushing is subjected to a thorough flaw test by means of industrial X-ray equipment.

The flange by which it is attached to its respective component is now fitted. This is done by heating the flange and hydraulically pressing the bushing into it.

On cooling, a shrink fit is obtained and its soundness is checked by a push test applied to the end of the stalk.

Next, a coat of sealer, coats of pigment and one of anti-tracking varnish are applied.

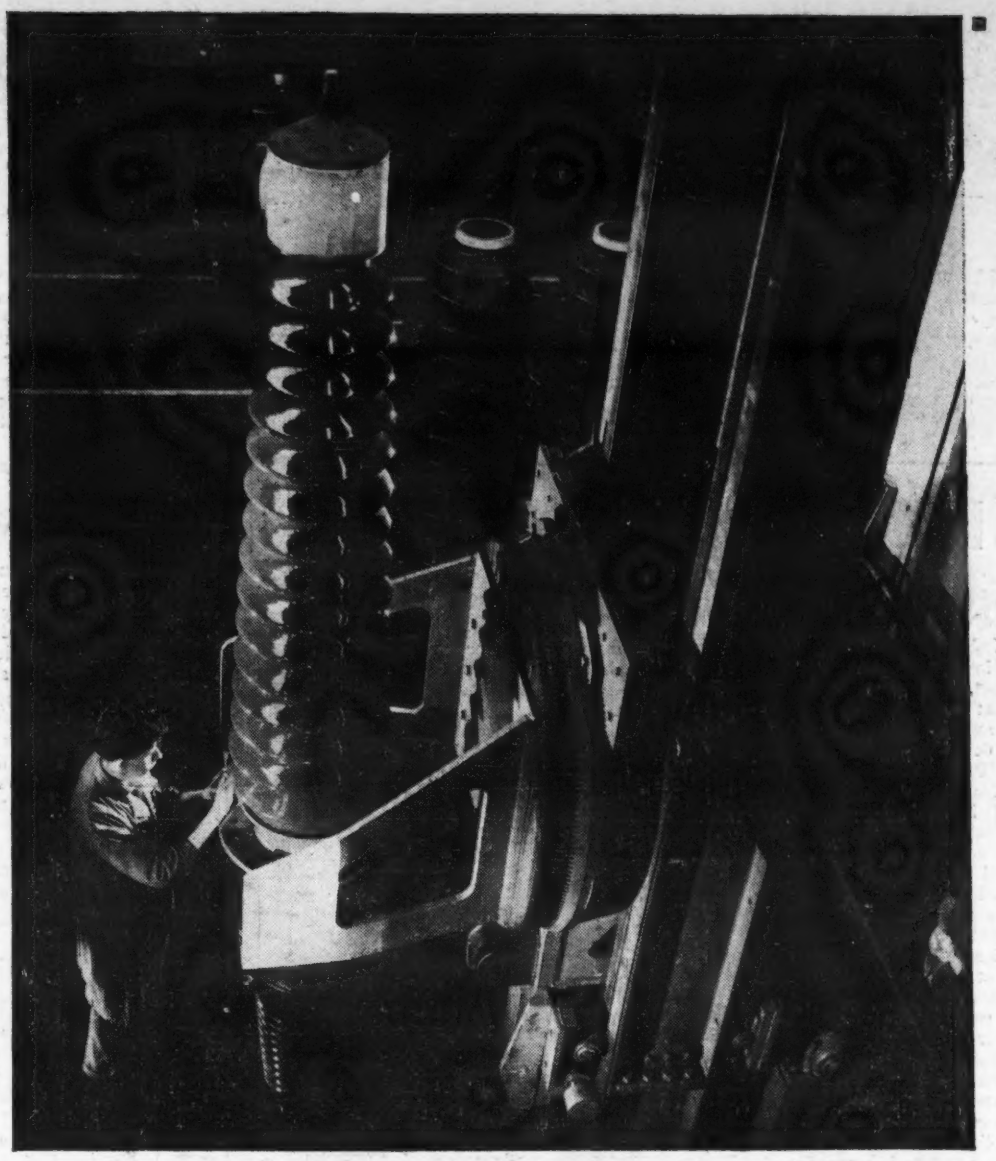
When the porcelain is added, the top cap usually contains springs which give a controlled loading during expansion or contraction caused by temperature changes.

At the same time they give mechanical strength to the porcelain-enclosed part of the bushing. Larger types are oil-filled, the top cap containing a filler.

Oil seals are incorporated to prevent leakage from the porcelain shell and careful checks are carried out to ensure their efficiency. Dependent on the type of bushing, an internal or external pressure of 10lb./sq. in. is applied for 24 hrs., during which there must be no leakage.

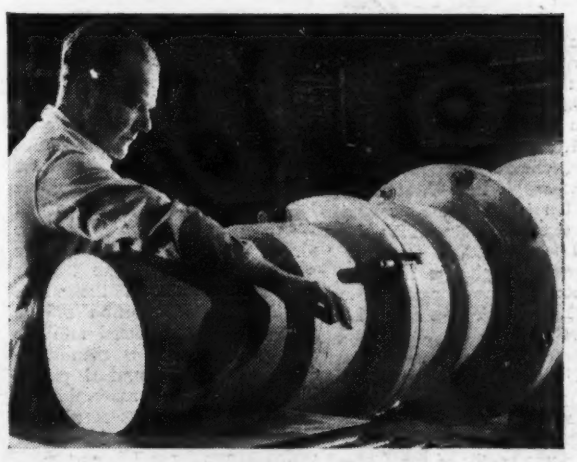
There follows the final electrical test in the high voltage laboratory. This is a one-minute withstand test during which a working voltage multiplied by a suitable safety factor is applied.

Some of the bushings for the 400kV supergrid will probably be 30 feet long. This power supply is due to be operating in 1965

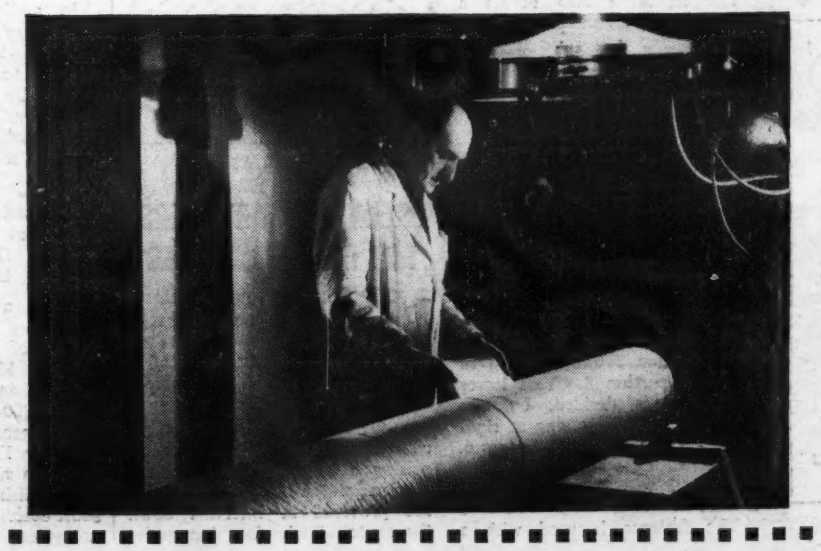


This manipulating machine is used to hold and manœuvre large bushings during assembly.

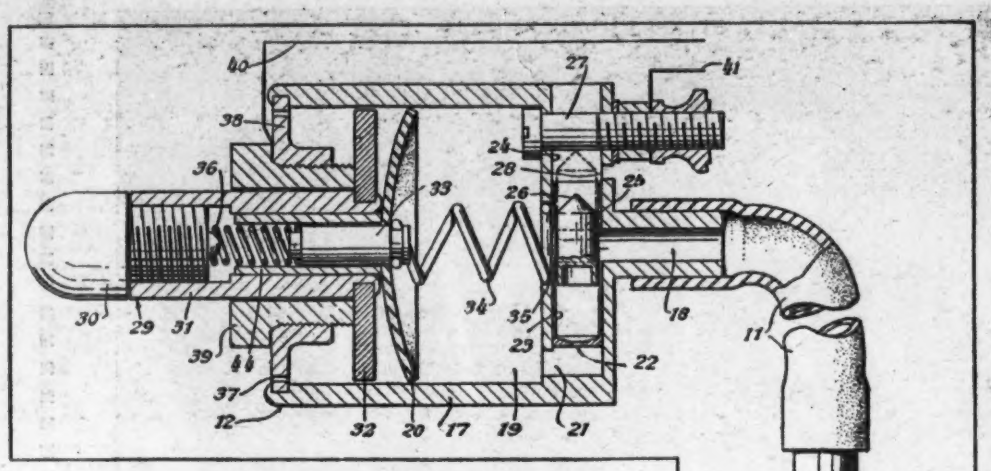
This synthetic resin bonded paper bushing is being rolled. As the paper is wound between heated rollers an operator inserts condenser foils at predetermined intervals.



Before insulators are manufactured, billets of clay free of air bubbles and of even texture are produced in a convenient working shape by an extrusion machine and then roughly cut to length.



In the X-ray room at the Bushings and Ceramics Division, this paper bushing core is being prepared for examination. This is made after rolling to check that all the condenser foils are correctly inserted so that voltage stresses are properly distributed.



PATENT No. 883,094

REMOTE INDICATING CAR 'DIPSTICK'

TO indicate that the level of oil in a vehicle engine sump is correct, the conventional and somewhat inconvenient dipstick can be replaced by a remote indicating device described by **the British Petroleum Co. Ltd.,** in **Patent No. 883,094.** Although developed in the first place for motor vehicles, the indicator is equally applicable for indicating the level of any suitable liquid contained in a tank or vessel.

In the new device, the dipstick is replaced by a hollow probe 10 which has an aperture 15 located at the desired liquid level. The probe is connected by a flexible conduit 11 to a supply of air under pressure controlled by the operator. When the liquid is below the desired level the aperture is uncovered so that air under pressure in the conduit will escape. If the liquid is at the correct level, the aperture is covered, and the pressure in the system is used to operate an electrical indicating device.

In the preferred form, the indicating device 12, located on the vehicle dashboard, is brought into operation by pushing in the push-button 30 which is in fact an electric light bulb. This actuates the diaphragm 20, causing pressure to rise in the chamber 19 and moving a piston 25, of electrically conducting material, upward in an electrically conducting sleeve 23. This uncovers pipeline 18 and allows air to enter the hollow probe.

If the liquid level is sufficient to cover the aperture, the pressure rise in the conduit and in sleeve 23 forces the piston further upward to make contact with the screw 27, completing the electrical indicating circuit. The latter comprises the supply line 40, attached around the stem of the bushing 39, the sleeve 31 into which the bulb 30 is screwed, a relatively weak spring 36, plunger 33, relatively strong return spring 34, sleeve 23, piston 25 and screw 27 to the return line 41.

To ensure good contact between piston 25 and sleeve 23, the piston may be provided with a flattened surface along its length, allowing the escape of air which will exert a radial force on the piston. The latter may engage the contact screw through a thin phosphor bronze contact secured to the wall of the sleeve.

Other modifications cover the use of an auxiliary fluid pressure source; an aural indicating device; and a probe with multiple orifices each separately controlled to supply information on the liquid level.

TOOL FOR DISMANTLING WRAPPED CONNECTIONS

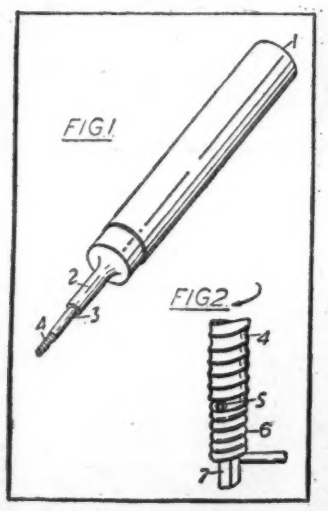
WRAPPED electrical connections, in which a good electrical connection is obtained without the use of any solder by wrapping one or more non-insulated wires for several turns around a terminal pin, are being increasingly used because of their reliability and the speed with which they can be made using special tools. Removal of the wrapped wire from the terminal pin has, however, presented some difficulties, which **Ferranti Ltd.,** in **Patent No. 884,136,** now claim to have overcome.

The invention provides a tool for unwrapping such connections which does not damage the terminal pin, and which retains the unwrapped piece of wire securely.

As shown in the illustration, a tubular portion 3 is attached to the extension 2 of the tool handle 1. At the free end of the tubular portion 3, the outer surface contains a helical groove 4. The wall thickness is reduced to substantially zero at the end 5 of the helical groove 4.

To unwrap an electrical connection comprising a wire 6 wrapped tightly round a terminal pin 7, the tube 3 is placed over the terminal pin 7 and is rotated in the direction of the arrow so that the free end of the wire 6 is caused to enter the helical groove 4 at the end 5. The tool is further rotated until the whole of the wrapped portion of the wire 6 has been forced into the groove. The tool is then withdrawn from the terminal pin 7, the wire since being retained in the groove and is thus prevented from dropping into the equipment of which terminal pin 7 is part.

The invention also covers a powered adaptation of the tool for simultaneously removing two wrapped connections from adjacent sub-assemblies.



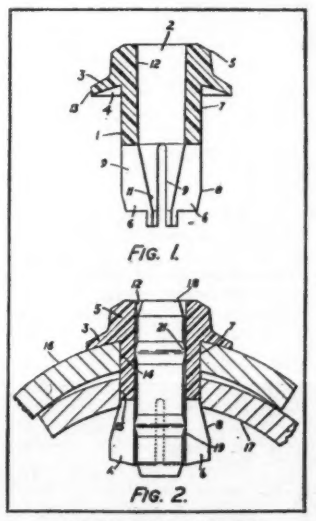
PATENT No. 884,136

RIVET FASTENER FOR CORRUGATED SHEETS

A NON- METALLIC rivet for securing together drilled corrugated sheet material is described by **Dowty Seals Ltd.,** in **Patent No. 883,478.** As shown in the illustrations, the rivet has a resilient non-metallic body 1 with a central bore 2 parallel over its upper portion 7 and tapering in its lower portion 8. This lower portion 8 is divided, by two diametral slots 9 crossing at right angles, into four flexible fingers 6. Integral with the body 1 is formed a flange 3 with a concave lower surface 4.

The fastener is used with a symmetrically ribbed pin 18 which can be completely inserted into the opening 2 in the body 1. For securing together two corrugated sheets 16, 17, the body member 1 is inserted into pre-drilled aligned holes 14, 15 until the concave surface 4 of the flange 3 abuts the surface of sheet 16. The upper portion 7 of the body extends completely through 16 and partly into sheet 17. The fingers 6 project beyond sheet 17.

The pin 18 is then driven into the opening 2 until it is completely inserted into the body. In this position the rib 19 on the pin deflects the fingers 6 outward, thus securing sheets 16 and 17 together. The upper rib 21 on the pin forces the upper portion 7 of the body into engagement with the wall of the hole 14 in sheet 16.



PATENT No. 883,478

PNEUMATIC RETARDERS FOR INCLINED CHUTES

FOR controlling the movement of goods down inclined chutes, pneumatic retarding devices are described in **Patent No. 882,814** granted to **Heinr. Auer Muhlenwerke K Ga A** of Germany.

In the case of a straight inclined chute, pneumatic retarders 2 comprising a hinged plate 4 with a diaphragm-like closure member 5, are provided at intervals down the chute. Each plate 4 occupies the whole width of the chute cross-section when in the closed position. The plate 4 and diaphragm 5 form a substantially airtight chamber 6.

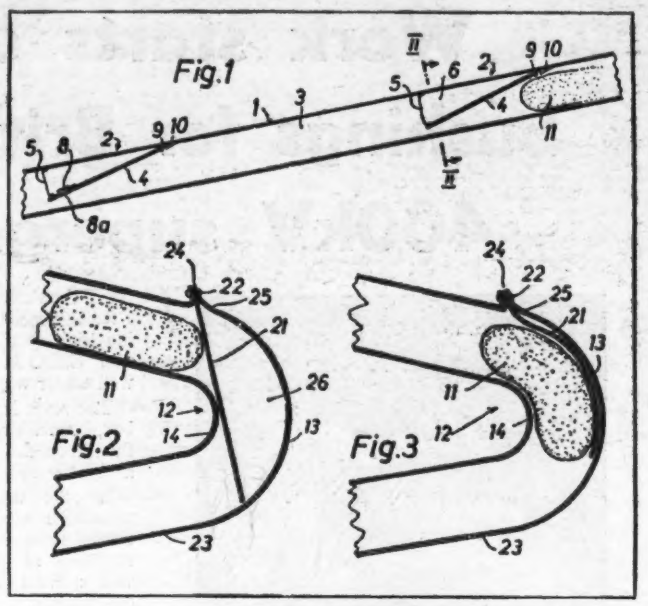
In operation, goods 11, arriving at the plate 4, forces the plate against the wall of the chute thus compressing the air in chamber 6, which is then slowly discharged from the chamber through apertures (not shown in the illustration).

This action arrests the movement of goods 11 until the plate 4 is resting without resistance on the goods 11. When the latter has left a retarder, the plate 4 is returned either by its own weight or, if disposed in a sidewall, by a spring strip, to its unloaded position. By this means the articles are advanced uniformly and relatively slowly.

The principle is readily applicable to vertical curved chutes—i.e. chutes which descend in short zig-zag lines in a vertical plane. Retarders can be located in the curved portion of the chute at each reversal station.

Referring to the illustration Fig. 2, each retarder may consist of a flexible plate 21 which, in the closed position, extends across the bend and over the whole width of the chute cross section to form a chamber 26 which acts as an air cushion. The goods 11 sliding down the chute are retarded both by the spring effect due to deforming the sheet 21 and by the air cushioning effect.

As the air discharges from chamber 26, the cross section of the chute channel is cleared and the goods slide slowly through the bend 13, after which the sheet 21 returns to the extended position.



PATENT No. 882,814

new PATENTS

BOOK REVIEWS

Short-Range Guided Weapons. J. Clemow. The Temple Press Ltd., London. 79 pp. 15s.

This monograph serves as an introduction to a series of works on rockets and missiles, and surveys the principles underlying the design of tactical guided weapons. A wide range of techniques is involved in the design and engineering of guided weapon systems, and successful project development is dependent upon satisfactory integration of such diverse subjects as aerodynamics, structures, servo-mechanisms, electronic computing, telemetry, and explosives.

After a discussion of the advantages of guided weapons, a chapter is devoted to a description of the main parts of a guided missile. Aerodynamic and propulsion considerations are detailed, and further chapters deal with methods of guidance and control systems. The final chapter sets out a hypothetical design problem for a surface to air missile, illustrating the way in which the requirements of the problem are met. A short select bibliography is given.

Subsequent monographs of the series will deal in more detail with the individual techniques encountered in missile design, and elaborate the design process as it applies to weapons.

In addition to providing an elementary introduction to the theory and practice of controlled missiles for the scientifically and technically informed, these books will prove of use to the educated layman who wants to know of the state of this important subject.

Vocabulario Tecnico Ingles-Espanol. (English-Spanish Technical Dictionary.) Hawthorn Books, Inc., New York. 170 pp.

This is a new edition of the dictionary put out by the publishers of the American journal Popular Mechanics. It has been enlarged and revised, and includes some 6,000 scientific and technical terms generally not found in ordinary English-Spanish dictionaries. In addition to translations of English terms into Spanish, short descriptions and explanations are given, and there is a number of line illustrations. Terminology in a wide range of technical subjects is covered.

Flight Test Instrumentation. Edited by M. A. Perry. The Pergamon Press, Ltd., Oxford. 163 pp. 50s.

This book deals with the considerable advances made in instrumentation techniques for the flight testing of aircraft. The volume contains the edited papers of the first International Flight Test Instrumentation Symposium held at Cranfield, which was attended by engineers from the U.K. and overseas.

The editor of this book is a lecturer at the College of Aeronautics, Cranfield.

Schatzsucher unserer Zeit. (Modern Treasure Hunters.) W. Newmann. VEB Verlag Enzyklopädie, Leipzig. 140 pp.

For once the translation renders the meaning of the original title. The author, who is a scientific worker at the Institute for Geophysical Research, Karl Marx University in Leipzig, discusses achievements on both sides of the Iron Curtain in methods of searching for underground "treasures": minerals, mineral oil, salt, coal, etc. He begins by dismissing dowsers, but he renders them one justice: their divining rods led the way to modern scientific methods.

The help given to geologists by geophysicists, magnetic, electric, seismographic, radiometric and geo-chemical developments increase the methods of scientific searching. An interesting statement made is in connection with spectrographic tests: apparently so far the Soviet Union holds the record of 1,800 analyses of heavy metals during a three shift day. The book ends with a significant note: the fashion in underground "treasure hunts" changes according to requirements, and these call for new methods. What will tomorrow's requirements be?

Z. FRENKIEL

Who Makes Machinery? Hoppenstedt Wirtschaftsverlag G.m.b.H., Darmstadt, West Germany. Available in Great Britain from Interbook Ltd., 12 Fitzroy Street, London, W.1. 1,000 pp. 18s.

The 23rd edition of this well-known West German directory of manufacturers of machinery and precision tools contains over 20,000 addresses of West German and West Berlin makers. The first part has an alphabetical register with more than 13,000 mechanical engineering products, and a classified register of suppliers. The second part contains an alphabetical list of manufacturers, and the third part consists of special enquiry cards for further information about the contents of the directory. The book is published in English, German, French, Italian, and Spanish.

Motorcycle Engineering. P. E. Irving. The Temple Press Ltd., London. 326 pp. 25s.

The modern motorcycle is, as the author says, "an engineering feat of no inconsiderable magnitude, on which a great amount of technical skill and manufacturing know-how has to be lavished". This book, written by an eminent motorcycle designer, is an account of the design and construction of the machines, with descriptions of the developments and improvements effected during the history of the industry.

The discussion of basic theory is avoided, but the special problems of size, weight and stability inherent in the design of a single-track vehicle are dealt with in a practical way. The component parts of the machines are thoroughly covered: ignition, timing, carburation, and steering geometry are discussed, and there are accounts of manufacturing methods and materials.

La Télévision du Noir à la Couleur. (From Black to Colour Television.) Andre Langevin, Savoire et Connaître, Paris. 192 pp. 4.95 francs.

The author, who is head of the Applied Electricity Laboratory, High School of Industrial Physics and Chemistry in Paris, has packed his book with information, illustrated by 73 figures and diagrams. The material is divided into four chapters, beginning with a review of the first steps in television by Caselli, Bain (1842), Backwell (1848), and Lenoir (1881).

From the "electric eye", through modern developments, the author reaches up-to-date research work in various countries. According to Mr Langevin the USA and the USSR are the only countries so far which send out regular TV programmes in colour, but I believe Japan also has regular services in colour TV Considerations on the influence of television on family life, TV applications in industry, in submarine search, etc., form the final chapter.

Z. FRENKIEL

BRITISH INDUSTRY PREPARES FOR THE COMMON MARKET

Sea and air routes give S.W. Wales strong export potential

Engineering News Industrial Editor, J. D. F. Perry, concludes his round-Britain series on the Common Market.

OF all industrial centres Swansea gives the most immediate impression of change. At the start of the last century a North wind would carry the acrid fumes of the copper works through the streets of the port. Now the arriving visitor sees the desolate mess where the old industry flourished, and finds around the busy and prosperous city new factories that are among the best of their kind in Europe.

Outside Swansea, on the newly built Jersey Marine highway, the Pressed Steel company have their £4 million Prestcold division works. For this 50 acre giant of refrigerator and domestic appliance production, entry to the Common Market will mean the opportunity to reach new levels of production economy with longer runs for the larger market, and at the same time the full rigour of competition with the highly economical Continental producers.

On the Fforestfach trading estate the successful new light industries include the well equipped toy producing firm Mettoy Limited, which has pulled off the formidable achievement of exporting toys to the West Germans and to the Japanese. Mettoy share in a total of toy exports from Britain which has grown to £9.6 million last year from a tiny £450,000 in 1938.

Diversification

Within the memory of most Welshmen South Wales was dependent upon the fortunes of coal and steel. As one Swansea man put, very directly, to me: "When one took a bump the whole place stopped."

Now diversification has been carried to the point where the shortage of skilled labour is acute and where firms that have set up in the area fear that new arrivals will only be able to staff their key posts by attracting away valuable men who are already in equally important positions with established concerns.

The South-West Wales region now numbers amongst its activities the formerly all-important steel and coal, oil, aluminium, titanium, sulphuric acid, chemicals, a variety of light engineering, clocks and watches, vehicles and transport facilities.

Port facilities

Along the Welsh shore of the Bristol Channel are spread five British Transport Commission ports, Swansea, Cardiff, Port Talbot, Barry and Newport. Swansea alone handles about half the total trade of the five.

Just over eight million tons of cargo were shipped through Swansea last year of a total for the five ports of 18 million tons. In the peak post-war year for the five ports, which was 1952, Swansea moved 11,600,000 tons of a total of 22,600,000 tons.

With the effect of the London dock strikes upon those responsible for shipping decisions it is possible that the importance of non-London ports such as Swansea may grow. But it is not only the goods manufactured in the Midlands that Swansea businessmen foresee moving to their port. It is the works themselves, pushed out to the coast by the delays and cost of moving materials to and manufactured products from inland sited factories.

While I was in Swansea higher road transport charges were announced, underlining the argument that this factor may in future play a part in influencing firms to expand by creating new works at coastal industrial centres. In the post-war years the Board of Trade have played an active part in bringing to south-west Wales the industries that have absorbed the men thrown out of their traditional jobs by the modernisation of the steel industry and the collieries.

Road building

Plans that I was shown at the Swansea Chamber of Commerce outline the structure of a new roads system which as it takes shape in the next few years will significantly ease road movement in the Principality. Through the Ross Spur motorway there will also be very much easier and swifter journeys into the Midlands.

From even a brief look at these road plans it is evident that there is at least one weakness. The important Heads of the Valleys route is shown as a three-lane road. For the mixture of heavy industrial traffic and fast moving private cars which will use this route this seems a prospect offering none of the safety of even a two-lane dual carriageway.

Swansea has shown its liveliness and adaptability in another field of transport. With considerable ingenuity and persistence regular private air services have been established between London (Gatwick) and Swansea. It is characteristic of recent developments in South-West Wales industry that an essential to one early stage of the air service were the regular passengers, engineers and others concerned with the setting-up of oil installations.

Labour costs

As a town which from the start of its industries has always looked, and traded, beyond England and Wales, Swansea is actively considering the possibilities of a British entry into the Common Market.

The not-so-long-formed export club brings together senior executives of an extremely wide variety of interests, under the chairmanship of the managing director of Unifloc Limited, chemical engineers who export to Australia, South Africa and to many other countries where there is a chemicals industry.

Now that light engineering, the manufacture of chemical plant, domestic appliances and so on, play a much greater part in the economy of the region, the proportion of its production costs which represents labour costs is at once a substantial one and one that is vulnerable to increases if the present wage claim for engineering workers is partially conceded.

"We can compete with the West German firms in markets outside Europe," the managing director of one company assured me. "We have been doing so whether or not in the Commonwealth for some time. But another rise in our production costs, and the labour cost content of our output is high, and we should be very seriously affected. We cannot match them in credit terms now, it will be a double handicap if we are pushed above the competition in our prices."

Racing car models pass along a conveyor at the Mettoy factory outside Swansea.

Trade pacts

I found the same belief in Swansea as elsewhere in this tour that the firms with capital and with existing heavy investment in modern plant and equipment will be in the best position to take the opportunities offered in Europe, and to meet, or to change in order to meet, the inrush of Continental, especially West German, competition.

For the small firms, subcontracting or providing a service to their bigger brothers, the opinion appeared to be that to survive and grow it would be best to be equipped for specialist work for which it would not be worth while a single large organisation maintaining a department, or else to be pretty swift in finding agreements or licence arrangements with suitable companies within the present European Economic Community.

The dilemma in which industry in South-West Wales could easily find itself is simply this. Its companies are currently, with the exception of the steel industry, very busy, able to make use of all the available labour force, and exporting to a certain degree. Like the rest of the country that amount needs to be raised if the perennial economic crises are to be ended.

If a flood of damaging European competition is not to be encountered it is also necessary to get costs of production down, and longer production runs, for which export sales are essential, are one way to lower unit costs.

But with a static labour force a sharply rising order book would at the moment mean for many firms a lengthening of delivery dates. More firms coming into the area in the future will to some extent complicate the problem.

One welcome answer would be a greater acceleration in training of skilled men. Where to live, I was told, is also a serious problem for any family coming to the area. It is in Swansea and places in the same predicament that the need for a national housing programme, if there is to be mobility of labour, stands out most clearly.

Another remedy lies with the greater adoption of automatic machines and advanced production methods. The demand upon the machine tool industry from South-West Wales seems likely to be maintained and intensified once Europe has been added to her home market, and to her unrestricted competitors.

The Prestcold division of Pressed Steel, on a site overlooking one of the works of a famous iron and steel company, is an example of a works with extremely high standards of equipment. Application of the Pressed Steel experience with motor bodies and panels is translated as a logical sequence to the manufacture of refrigerator bodies. The result was the decision to make a Pressed Steel refrigerator, the practical effect being the Prestcold range.

From Cowley, Oxfordshire, and Theale, Berkshire, the work of the Prestcold division has been transferred to the bright new works fronting the Jersey Marine road and the labour force is to be some 4,000.

Refrigerator ownership, among British families still a long way behind the North American incidence, is nevertheless much more common in the United Kingdom than in many of the areas of the Common Market. As the shop windows of English and Welsh High Streets have testified. German refrigerator manufacture is a competent and highly cost-competitive affair.

Volume output

Participation in the wider market will give the Prestcold division the opportunity to raise productivity on the basis of heavy volumes of output. A situation without which competition in markets outside Europe, and even in the solely British market, could become difficult to overcome.

Refrigerator production has led to the export of compressors and also to the development of a family of domestic appliances. The company's dish washing machine has been launched and is in production.

The traditional British practice of providing a home for the refugee has brought more than one new industry to the country. Mettoy Limited is a flourishing enterprise set up, originally in Northampton, by two refugees from the Germany of the 1930s.

Model cars

Along with the three other big producers of toys in Britain this company has helped to bring toy making from the day of the craftsman at his work bench to the position where initial design work is followed by costly tooling up and mass production.

An important part of the Mettoy production is Corgi model cars, for which the makers of the cars or trucks provide drawings, and a tendency has been observed, in some export markets, for the models to follow the originals.

The Mettoy toy makers have an export record and a potential which is closely related to skill in keeping up with changing fashions among their customers. These movements are not easily predictable. Children have for some time now been found by the company to be more or less unreceptive to offerings of rocketry or rocket launching vehicles.

An enterprising piece of export sales promotion has been the 23-edition catalogue of Corgi models. Many of the editions are in foreign languages and they cover Australia, Austria, Belgium, British East Africa, Canada, Denmark, Eire, France, Germany, Holland, Hong Kong, Italy, Norway, Portugal, Rhodesia, Singapore and Malaya, South Africa, Spanish speaking territories, Sweden, Switzerland, the United Kingdom and the U.S.A. An edition was also printed in English but without prices in order to cover other countries.

Direct routes

In increasing its exports, and in playing a full part in a large European Community South-West Wales would gain from the widespread application of this sort of promotion, which plainly allows for the special needs of the potential customer.

The area could also benefit from changes in the transport system which would minimise the impression of distance from London. It is not difficult to take a train which covers the long journey from Paddington to Cardiff in 2¼ hours. But then for the relatively short remainder of the trip the train will take another 1¼ hours, giving the feeling of venturing into very remote parts, and certainly deterring the visiting executive from overseas who is not necessarily prepared to spend five hours each way.

Direct main line services that recognise that Swansea and industry are as important as Cardiff and administration are needed. With its happily fog free airport, direct Swansea to the Continent air services will have a useful contribution to make in the future.

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DECIMAL DOUBTS

IF we are to change our units of measurement, it is generally assumed that we should adopt the metric system, but is this the best choice?* Colonel P. R. MacIver, A.M.I.Mech.E., A.R.Ae.S., M.B.I.M., A.I.I.Tech., F.B.I.S., R.E.M.E., *examines alternatives.

NOVEMBER 16 issue of Engineering News contained an authoritative account[1] of the consideration that has been given to adopting the metric system and decimal coinage in Britain. The author drew attention to the difficulties in terms of cost and resistance to change, and expressed the opinion that years of co-existence with a variety of international standards suggest that change is not necessary, though it may be forced upon us if we join the Common Market.

He also said, "If there are two systems in existence, the logical development is to adopt the one which is best established or which has the greater merits. But if you are going to make a change on a merit basis this must be sufficiently clear and advantageous to convince the majority."

Now the decimal system, together with Continental weights and measures, offers so many advantages over vulgar fractions and our present multiplicity of scales that we are inclined to think of this as an attractive alternative. As a manipulative tool of mathematics decimals are so often much more efficient than fractions that we are content to translate freely from one to the other in spite of the cost in terms of time, effort and accuracy.

A fresh start

Our scientists are properly committed to the MKS standards of metre, kilogramme and second, and our own weights and measures are defined in terms of the international gramme and metre. One nation after another has changed to decimal coinage for obvious convenience while our high standard of education sustains us in dealing with such complications as a 12 x 20 scale of coinage, a 12 x 3 x 1760 scale of length and a 16 x 112 x 20 scale of weight — excluding frivolities such as rods, poles, perches and much-used terms like acre and half-crown.

Should we cast off the shackles of our inefficient system and fall in line with our neighbours who certainly enjoy something better, without further thought whether we are also joining them in ignoring the best answer?

Let us consider the qualities we would seek if we could change to a new and better system of notation and measurement, unprejudiced by established habits and thoughts of the Common Market. In other words, what would we choose if we had a chance to start again *ab initio*?

The number of digits must be great enough to allow us to express large numbers compactly, yet small enough for us to remember and manipulate them with facility. The base must offer if the more vulgar fractions are convertible to x-imals[2] without involving recurrence or a number of x-imal places that defeats the average memory.

It would be a very great advantage if our system were so much more convenient than fractions that these became confined to mathematical calculations. "Point five" is as easy as "a half", but "point three recurring" doesn't conjure up the simple image of "a third".

The number of digits was unity in the Roman system of notation which required a thousand of them to indicate the number 1000 until V = 5, X = 10, L = 50 and the rest made it compact enough to be practicable. In contrast the digital computer per- a satisfactory availability of factors and it is an advantage forms wonders on a binary base but is only capable of doing so by virtue of its retentive memory.

The human brain would be as incapable of manipulating the binary base as it would be of dealing with a thousand different digits. In this case "manipulate" includes learning multiplication tables up to 1,000 x 1,000 = 1,000,000, which is such a large number that, counting at a rate of one hundred per minute, it takes nearly twenty-one eight-hour day to reach.

To help us select our ideal system of notation we must assess our requirement and our capacity, and history and experience will help. Ptolemy, in the second century A.D., introduced sexagesimals[3] in a clever system of notation that did not involve learning fifty-nine digits and a zero, which he probably avoided on the ground that it would have involved unreasonable feats of memory.

Fractions

It may be assumed that the maximum practicable number of digits is substantially below sixty; on the other hand, we find working to the base ten so easy that we could obviously tackle something more ambitious.

Factorial and fractional convenience is the criterion from which the best base can be selected from such a range as is found to be practicable. The chart offers a comparison from which the convenience of fractions can be judged, in a series from half to reciprocal, up to 12 and then confined to numbers up to 40 with at least six factors.

The percentage of "inconvenient" fractions requiring six or more x-imal places for their accurate representation, highlights the advantage that seximals have in this characteristic. The bases 12 and 30 are the only others within practicable limits that offer under 40 per cent inconvenient fractions, and of these two trigintimals have a commanding lead over duodecimals in availability of factors. There are six factors of 30 including three prime numbers, while 12 has only four factors with two primes.

Trigintimals

It is easy to conclude that ten is not the best base, with only two factors and 44 per cent inconvenient fractions, and to recognise that we should not accept this, another bad system, just for the sake of uniformity with other countries.

Duodecimals have been considered as an alternative for so long that the dozen and gross are terms in common use and the "great gross" of 12[2] is still on record. If mankind had been born duodecidigital our notation might well include two extra digits such as ℰ = 10 and δ = 11, and the thought that 9 x 9 = 69 and δ x δ = ℰ1 would be natural. We would think in terms of .6, .4 and .3 as easily as ½, ⅔ and ¼.

Trigintimals, as an alternative, suffer from the disadvantage that they have never had a sponsor. They offer the greatest benefits as a practical system of notation, plus the attraction of ease of comparison with other systems.

In measurement of distance, for example, 30 centimetres are so nearly equal to one foot (30 cm = 1ft. — 1.57 per cent nearly) that the foot could be introduced into our new system and defined as exactly 30 centimetres, a proposition now being considered by the British Standards Institute.

Weight measure

In measurement of weight 900 grammes are very nearly equal to a very familiar domestic quantity, two pounds avoir dupois (900 gm. = 2lb. — 0.775 per cent nearly. Our currency could retain a traditional basis of 30 pence equalling one half-crown and 30 half-crowns could equal one triginta (or whatever we choose to call it) which would allow the retention of existing coins and notes for a convenient period. Circular measure would be easier than the decimalists ever dreamed and temperature scales would offer no special difficulty.

A change as radical as that suggested must be sufficiently clear and advantageous to convince the majority, and the majority would be convinced either by an impressive publicity campaign which might well be of the same magnitude as the cost of implementing such a change, or by offering an alternative system that would run in parallel with its inefficient alternatives and prove itself on its merits.

First step

This is also the way to economy in change, for the old machine can be used until it wears out—or proves its own inefficiency.

The concept of a new scale of notation is far more forbidding than decimalisation of currency, which has failed to appeal to the public. The practical approach to any such change is the introduction of a stepping-stone.

The first step would be the establishment of the trigintimal module, encouraging the public to think in thirties rather than in tens, by equating the foot to 30 centimetres, the 2 pound *novacent* to 900 grammes and so on.

When the 30-base module became a part of our National life, we could more easily assimilate trigintimal notation. Until then we could live in amity with our metric friends with only the factor three to prevent them joining us in realism.

BASE	2	3	4	5	6	7	8	9	10	11	12	24	30	36	40
PERCENTAGE "INCONVENIENT" FRACTIONS	0	50	33	75	20	83	57	75	44	90	36	52	38	63	67
FACTORS			1		2		2	1	2		4	6	6	7	6
PRIME FACTORS			1		2		1	1	2		2	2	3	2	2

[1]**Should Britain Go Metric?** by Group Captain Edwin Shipley.

[2]x = 10 in decimals, x = 12 in duo decimals and we are seeking x = some better base.

[3] Ptolemy's 60-base system used the 24-letter Greek alphabet plus three other symbols in a manner which allowed him to manipulate circular degrees and their factors to serve his astronomical calculations.

NEXT WEEK

IT has been said that if the River Thames could be continuously cooled by 5°F, enough heat would be obtained to heat the whole of London. Making use of natural sources of heat in this way can be achieved with heat pumps.

An authoritative article in next week's Engineering News by Miss M. V. Griffith, B Sc, F Inst P, Head of Heating Research at the Electrical Research Association, will discuss some of the applications for which HEAT PUMPS can give greatly reduced operating costs for both heating and refrigeration, also the limiting factors for this type of equipment.

Mr. L. Taylor Harrington of the British Institute of Management will discuss INTERFIRM COMPARISON SCHEMES. These have been introduced to provide managements with objective standards for performance.

No country has a greater export potential

IT is surprising to many Americans to learn that slightly more than 3 per cent of our gross national product is sold outside the United States. Most people consider the value of exports to be much higher. Of the four leading exporters—United States, United Kingdom, West Germany and France — West Germany exports the highest percentage of its gross national product while the United States exports the least.

From the table it is obvious that international trade is far more important to the United Kingdom, France and West Germany than to the United States, even though the total amount of export business of the three nations is only 50 per cent greater than that of the United States.

Of the 300,000 firms in this country no more than 12,000 send goods overseas or engage in importing. It follows that for American business to conduct the largest world trade with relatively few companies engaged in export some of these must be very large and very active.

* * *

The effect of congressional action on renewing the General Agreement on Tariffs and Trade (GATT) will no doubt be more marked abroad than in the U.S. A fight looms in Washington over renewing the Reciprocal Trade Agreements Act, which authorises US adherence.

The Kennedy administration, liberal in its attitude to trade administration, appears to be seeking two unprecendented powers: one, the power to make across-the-board tariff cuts to negotiate with the Common Market and, two, the authority to recompense American firms damaged by increased imports resulting from agreements with the Common Market countries.

* * *

The Common Market represents a departure from the GATT philosophy of encouraging private trading agreements. The trend is towards regional tariff fixing, a shift in the ever present compromise between free private control and state control philosophies.

Regardless of congressional action it is likely that more attention will be given to export business by American firms. The $16.4 billion of exports from the U.S. in 1958 will increase in the next few years as American firms seek greater participation in the Common Market.

No other nation exports nearly so much, nor has the potential capacity to export more.

Country	Gross National Product (billions of dollars)	Export (billions)	Per cent
Netherlands	9.6	3.2	33.5
Belgium-Luxembourg	11.6	3.1	26.2
Denmark	5.0	1.3	25.5
Switzerland	7.6	1.5	20.5
Sweden	10.6	2.1	19.7
Austria	4.8	.9	18.8
Norway	4.0	.7	18.6
West Germany	54.1	8.8	16.3
Canada	33.6	5.2	15.5
United Kingdom	63.8	9.4	14.7
Portugal	2.1	.3	13.9
Italy	21.0	2.6	12.3
Japan	28.6	2.9	10.1
France	56.1	5.1	9.1
United States	444.2	16.4	3.4
All nations except U. S.	302.5	47.1	15.5
Common Market Nations	152.4	22.8	14.9

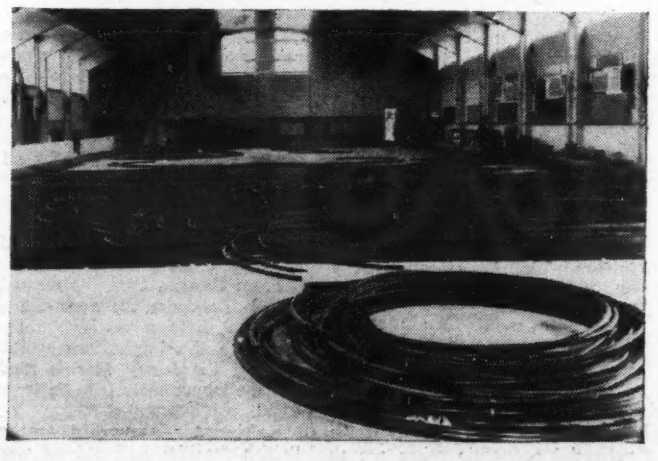
PLASTIC TUBING IN CURLING RINK

New material cuts initial and maintenance costs

FOR the first time in Britain plastic tubing has replaced conventional steel piping to carry refrigerant for ice rinks.

This has been used by the Scottish Ice Rink Co., (1928) in their new annexe at Crossmyloof, Glasgow, under a four-rink curling slab. Over 22,000 feet of 1½in. bore "Polyore-Alkathene" tube to B.S. 1972, in 385 coils was supplied by Yorkshire Imperial Metals Leeds.

Installation costs are estimated to have been cut by two-thirds, and the anti-corrosive plastic reduces maintenance costs.



Some of the four miles of plastic tubing used under the Crossmyloof curling rink.

The practice in ice rinks is to weld steel pipes and lay these in a grid system with bends. These steel pipes are screwed and coupled to the main header supply pipe. These grids in turn are laid in concrete.

By the introduction of plastic tubing, lengths of pipes are cut as required and secured to the headers by circlips and form a continuous grid circuit. The cooling medium, in this case, brine, is pumped at some 15-20 lb. sq. in. at about 12-14 degrees F.

This new annexe at Crossmyloof was opened in September and the quality of ice is reported to be good. Restricted revenue from the increasingly popular sport of curling has been insufficient to meet the expense of new steel pipe.

Securing (right) the plastic tubing to the "headers" set in concrete.

EDUCATION and TRAINING

APPRENTICE AND SUPERVISORY COURSES

PRESSED STEEL INVEST IN FUTURE EXECUTIVES

by

OUR EDUCATION CORRESPONDENT

THE Pressed Steel Company have trebled their number of employees from seven thousand immediately after the war to twenty-two thousand at the present time. With this rapid growth, and plans for considerable future expansion, the company's Board decided to increase the already substantial provision for the training of personnel.

Effective training schemes for craftsmen, technicians, technologists and managers at all levels have been devised to give standards which rank among the best in British industry.

As reported earlier in Engineering News, a £250,000 Training Centre was opened in September at the company's headquarters at Cowley, Oxford, by Mr. W. J. Carron, K.S.G., M.A., President of the Amalgamated Engineering Union.

This brought together the schemes already in operation in various buildings throughout the plant, and there was a considerable expansion of apprenticeship and commercial training facilities.

Training Centres on a smaller scale have also been provided for the company's Swindon and Linwood (near Paisley) factories, where there are approximately 50 apprentices at each factory.

The company recruits about 200 apprentices each year within the Group and at present there are some 750, but it is hoped to raise the number to 1,000 within the next two years.

In the Oxford area a certain amount of difficulty is experienced in recruiting sufficient student apprentices locally due to the numbers required and the "University consciousness" of those boys who attain G.C.E. "A" level standard.

Aptitude tests

To overcome this difficulty the company has built a special Hall of Residence in the country nearby which will house some 35 persons. This will provide facilities for studying, hobbies and games including tennis courts and a swimming pool, for students recruited from outside the Oxford area. They will live here during the first year of their training, then transfer into private lodgings approved by the company.

Apprentices in the past were usually trained within one department, but now the company has comprehensive schemes for craft, student and graduate apprentices.

The system for selecting apprentices is based on the use of six tests devised by the National Institute of Industrial Psychology.

The tests are designed to measure a boy's aptitude and ability in the qualities needed in engineering. Therefore his ability to recognise spatial relationships, his degree of mechanical mindedness, his verbal and non-verbal intelligence, together with his ability in arithmetic and general mechanical information, are tested, and the results obtained provide a basis for the interview.

Low wastage rate

The tests take up to three hours, but no boy is failed on these alone: a decision is reached only when all the available information has been assessed and an interview completed. The small wastage at the end of apprenticeship indicates the thoroughness of the company's selection methods.

All apprentices at Cowley commence their apprenticeship in the engineering workshops in the new Training Centre and after serving a probationary period of six months they are indentured.

In the Centre the course covers Engineering Drawing, Fitting, Machining, Patternmaking, Sheetmetal Work and Welding, and each craft apprentice specialises in a trade during his final two months in the Centre. All first year apprentices spend two one-hour periods each week in the gymnasium.

The Centre provides first class facilities for training and ensures that each apprentice obtains a firm foundation in his craft.

After the first year's basic training the apprentice spends one year in his specific department; one year on a programme of departmental training outside his own; and two years specialising in the field of his final choice.

Language training

The student apprentice follows one of five different courses—Research, Development and Laboratory, Design Engineering, Production Engineering, Commercial, or a General Apprenticeship for those who are not able to decide immediately on any particular type of work.

Apprentices destined for Commercial Departments spend the first year in the Basic Workshops in the Centre, and the second in production departments in the factory, before specialising in their final years in such departments as Accountancy, Purchasing or Cost Estimating.

The well equipped machine shop in the Training Centre.

The company recognises the need for its staff to study a foreign language and this is integrated into the Commercial apprentice's training at technical college.

Design and Production Engineering Apprentices training for the drawing offices spend six months in an Advanced Drawing Office Training School, after the first year of Basic Training in the Centre, and before commencing specialist training in the drawing office. During the next three years a complete year is spent in production departments of the factory.

Day release is provided for all apprentices who attend their local technical college. In the case of craft apprentices, this form of training may end at the age of 17 years if they are not making progress.

Student apprentices must progress with their studies as a condition of employment and at the O.N.C. level the best students are selected for a four year sandwich course leading to the Higher National Diploma.

The company does not enthuse over the block release system at the present time. The Group's Training Manager said that the company considered it better for the boy to have shorter periods of one day per week when he can follow this with individual evening study.

In the longer periods of the block release, it is difficult for the student to adjust himself rapidly from the practical factory work, and due to the compression of work it is not possible for the student to follow up with so much individual study in the evenings.

During apprenticeship the company organises a course of lectures and films to inform the boy how the company is organised and how it works, together with various lectures on subjects such as Production Control, Work Study, Steel Pressing Techniques and Communications.

Graduate courses

The company is an operating authority for the Duke of Edinburgh's Award Scheme and all apprentices are encouraged to take part. There are 70 now on the course, which is designed to develop character and leadership potential.

In addition to this scheme the Company sends selected apprentices to the Outward Bound Courses, the Industrial Welfare Society Apprentice Conferences and courses in Social Studies at Nottingham University.

An increasing number of graduates are recruited each year to carry out a two year full-time training programme. During the first year they study the various departments of the Company, learning their functions and problems, as well as attending a tutorial session each week in the Training Centre.

In the second year, in addition to their normal studies, investigations are carried out for the management. A recent example of such an investigation took place at the Ideal Home Exhibition, where the graduate trainees analysed the marketing systems of dish washer manufacturers.

The training of supervisors is also part of the company's policy. Courses of three weeks' duration are run consecutively throughout the year. They are designed to give foremen a broad idea of how the company functions and how the specialist departments fit in. Emphasis is placed on Human Relations, Industrial Relations and negotiating procedure, and one week is devoted to Work Study.

Future plans include the introduction of a one week course for new and potential supervisors to be followed later by more detailed three week courses.

The company is making a realistic approach to the improvement of Industrial Relations, and provides facilities for shop stewards to attend special courses, two hours a week for sixteen weeks. These courses are run by the University of Oxford, through its Delegacy for Extra-Mural Studies.

The company's rapid expansion and a high retirement rate have made it necessary to provide a supply of potential managers and supervisors.

Future managers

Each year ten or twelve men between the ages of 25 and 35 are selected for the Executive Development Course. This is a two year full time course designed to broaden their knowledge of the company's activities, train them in the techniques of management, and fit them to carry a weight of responsibility at an earlier age than would otherwise be possible.

Application for the course is made individually by employees who feel they have the necessary qualities. Selection is in three stages—initial interview by the Group Training Manager, intermediate interview by a board of senior managers, and final interview by a board of four directors. The successful candidates join the course in groups of five or six at six-month intervals.

During the first year of the course training takes two main forms. Four days each week are spent in the various departments of the company, the object of each course member being to find out as much as he can about the working of the Company.

A training report is written on each department and is criticised by the department superintendent concerned and the Executive Development Officer. The fifth day each week is spent attending lecture and discussion sessions in the Training Centre. In addition one week full-time courses are run in such subjects as Work Study, Communications and Financial Control.

Pressed Steel's Cowley Training Centre, opened in September.

During the second year the training follows a similar pattern with some important variations. Specific tasks, often requested by directors, are allocated to course members in the form of special investigations. These serve two useful purposes—they test the initiative and ability of the member, and provide a useful service to management.

In addition, a member's successful completion of an investigation may lead to his joining the department where he carried out the work. When a member is being trained for a particular department a special task connected with it will usually be allocated to him before the completion of this training.

An important feature of the second year is the series of visits made to other organisations. The places visited range from other companies in the motor industry to completely different types of organisation such as coal mines. The objects of the visits are to study the problems faced and solved by a diversity of businesses.

Group projects

Course members are also encouraged to increase their knowledge of management and other subjects by being allocated syndicate projects. Working in groups under appointed chairmen they study subjects such as Incentive Schemes and Automation, produce a written report and also make verbal presentation of their findings for the benefit of other course members. Practice in speaking to groups of people is a particular feature of the course.

The Executive Development Course has been in operation for over four years and is well established, although it is subject to constant revision. Thirty members have gone from it to responsible posts in the Company.

A second course following a similar pattern, though of only six months' duration, has been introduced within the last eighteen months. This is the Supervisory Development Course, designed to train suitable employees from the Technical, Commercial and Production departments of the Company and return them to their original departments as potential supervisors.

The training programme is planned to suit their individual needs, and this course too is rapidly becoming an established activity of the Training Department.

It is important to stress that neither of these courses interferes with the normal methods of promotion within the Company.

In addition to its own training schemes the Company sends selected members of senior management to the Administrative Staff College at Henley.

Design for welding

TWO courses of evening lectures are being arranged by the School of Welding Technology for designers and draughtsmen in the Manchester and Leeds areas. Both courses will start on January 24 and consist of nine weekly lectures, each lasting about two hours.

The Manchester course is intended for designers and draughtsmen in the structural steelwork industry while at Leeds the lectures will deal with design for welding in all branches of engineering.

Further information may be obtained from the Institute of Welding, 54 Princes Gate, Exhibition Road, London, S.W.7.

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ENGINEERING NEWS

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Thursday, December 28, 1961

Small firms could gain

IN these days of take-over bids and agglomeration of small firms to form large units, it is encouraging to note that something over 40 per cent of the people employed in the engineering industry are with medium and small firms.

This information is given in the recently much publicised FBI report on industrial research in manufacturing industry, which defines large firms as employing more than 2,000 people.

* * *

The report emphasises that many engineering firms, including some large ones, are still lagging in appreciation of the need for development and research, in spite of the fact that this is a field in which it would be particularly rewarding.

Furthermore, engineering products account for a high and growing proportion of U.K. exports, where competition is increasingly affected by the rate of technical development; also, many other industries depend on engineering progress for the equipment and machinery needed in their own development.

The position of the research associations is of special interest, as many firms have reported that their R and D activity is limited by inadequate external facilities.

* * *

On the other hand, the number of firms who reported that they were not members of any research association was higher in engineering than in other industries, and this shows some of the difficulties in interpreting figures from such a diverse and often highly specialised industry as engineering.

One fact, however, stands out: small- and medium-size engineering firms are not taking enough advantage of the facilities of research associations.

This is surprising, because the cost of these associations must necessarily be borne mainly by large firms and the Government, and smaller firms stand to gain more in comparison.

Tomorrow's technology

THE ultimate limit in the strength of structural materials is that achieved from atomic adhesion. The highest strengths so far developed in metals by metallurgical treatment (alloying, heat treatment, and working) is still a small fraction of the theoretical strength available from the flawless cohesion of atoms in a metal.

It is known that fine crystal filaments—whiskers—have the highest strengths of known materials, and in some cases their strengths have approached the theoretical limit.

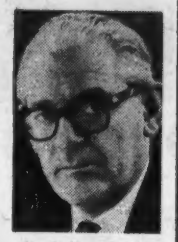
Assuming that whiskers could be mass produced in usable forms, reduction to one-fifth of the conventional weight appears feasible.

The most likely materials to find early application seem to be silicon carbide and aluminium oxide, owing to their resistance to corrosion.

— SCANNER

An Engineer's DIARY

Two more men find room at the top



Sir Julian Pode

I see that two busy industrialists who started with quite different educational qualifications are to take up leading positions in the British Iron and Steel Federation in the new year.

Sir Julian Pode, deputy chairman and managing director of the Steel Company of Wales becomes president of the federation on January 1.

The federation's council has also signified its intention of appointing Mr. Graham Stewart, who is chairman and general managing director of Stewarts and Lloyds, as president-elect for 1962.

Sir Julian, 59, who is a chartered accountant entered the steel industry in 1926 with Guest Keen and Nettlefolds at Dowlais.

On the formation of The Steel Company of Wales in 1947 he was appointed managing director, became deputy chairman this year, and succeeds Mr. H. Peake as chairman in 1926.

Mr. Stewart has held his present position since 1945. He obtained an engineering degree at Cambridge, then spent seven years in the works and offices of Stewarts and Lloyds at home and abroad.

He was appointed a director in 1931.

FLASHBACK: Mr. A. C. Stewart, president-elect of the British Iron and Steel Federation, shows the Queen and the Duke of Edinburgh round the Corby works of Stewarts and Lloyds.

Built-in skill

SOME firms, notably those engaged in light engineering, often get their new products mentioned in the technical press.

On the other hand, those who work to provide heavy engineering products such as ships and precision heavy machine tools essential to our way of life sometimes receive less attention than they deserve.

A good example of a first class heavy engineering firm is Craven Bros, who specialise in design and manufacture of custom-built machine tools. Their design and manufacturing facilities are acknowledged to rank among the best in the world in this field.

On entering their Stockport factory one feels an air of solidarity and tradition based on over a hundred years of heavy engineering experience which almost belies the progressive practical outlook of the management lead by Mr. James Lauchlan, chairman and managing director.

Points study

IT looks as though we are now considerably nearer to the adoption of a decimal coinage. A committe is being set up to undertake a "feasibility study", subsequent to the Government accepting the decimal system in principle.

The chairman of the committee will be the Earl of Halsbury, who is well qualified in the practical side of the matter.

After Eton and a conventional beginning in accountancy in the City, Lord Halsbury took a B.Sc. with first class honours in chemistry, the hard way—at night school as an external student of London University.

During the war, he worked on the design of special steels for gas turbines and jet engines, in the Sheffield laboratories of Firth Brown.

In 1946, he became research manager, and later works manager, of Decca Records, where he worked on the plastics materials which made long-playing gramophone records possible.

He spent 10 years as managing director of the NRDC, is a past president of the Institution of Production Engineers, the first president of the Machine Tool Industry Research Association, and is a director and scientific consultant to a number of engineering concerns.

With this impressive record to inspire them, the new committee will no doubt carry out their terms of reference with efficiency and determination.

Without wishing to appear presumptuous, I commend Colonel P. R. MacIver's article "Decimal Doubts", on page six of this issue, to the committee's attention, to start them thinking.

One symbol less

ANY engineering firm that can overcome the chronic tendency in the industrial estates west of London to be more or less permanently around ten per cent short of skilled men is worth attention. The firm that can do the trick more or less overnight even more so.

This is what Adrema, the data writing business equipment and production control company at West Acton succeeded in doing and I was talking recently to Mr. Eric Jones, the ex-Solartron managing director of the company, on some of the things that have been done since this success was achieved.

"It was giving all our people staff status, that did this for us," Mr. Jones told me.

Now the company have brought out a new idea in their gay and efficient canteen; anyone who wants can eat in the executive restaurant.

Less boisterous

There is some extra payment for waitress service, and I found a distinct quieter atmosphere than in the exuberant canteen with its juke box (and fruit machines to come).

Sharing his lunch table with the convenor of the shop stewards I found that few people have yet made the move from the general canteen to the executive restaurant.

"Some may," the convenor suggested," but you have to pay a week in advance and a lot of our people like to go on a day-to-day basis."

If Adrema start a general movement against that status symbol of industry—the level of canteen in which you eat—they will have made a valuable contribution to easier and more continuous industrial relations, and also to ending some heavy canteen subsidies. Their own canteen profits go straight into the social fund.

John Heywood

SOVIET ENGINEERING

by our own correspondent

Automatic warehousing in Moscow cable works

ONE of the problems which exercised the attention of Soviet engineers and industrial economists for some years now in the unceasing quest for a steep rise in the productivity of labour has been that of mechanising and if possible automating the storage and packing sections of the industrial enterprises.

What is called an automatic warehouse has now been built in the Moscow Cable Factory.

The project was designed by the All Union Scientific Research Institute for Hoisting and Conveying Machinery and apparently provides for the computer control not only of the sorting of the various finished products into the different sections of the warehouse but also for the instantaneous inventory of what is available and where in the stock.

The report does not describe the actual computer used but one suspects that it is not electronic as it is the Russian practice to specify this when such a computer is employed.

* * *

The automation of the hoisting and transport system is effected by an overhead conveyor system connected by remote controlled indicators with 360 storage paths each 10 metres long.

Located in each path are some 16 containers capable of hoisting up to 200 kilograms and the warehouse can stock in all some 5,600 containers.

The computer not only records the information on the documentation of the incoming items but selects the most suitable path for storing the item—a selection of one possibility out of 360.

Further it appears that there is a system of servo-mechanisms which are activated automatically as soon as the information has been recorded by the computer.

* * *

It is estimated that the investment involved in building the factory will be paid off in 3.8 years and this is regarded as being favourable in comparison with various projects for automating the hoisting — transport work in the Likhachev and Gorki automobile factories.

The hint is clear; these factories and many others are being advised to adopt the system.

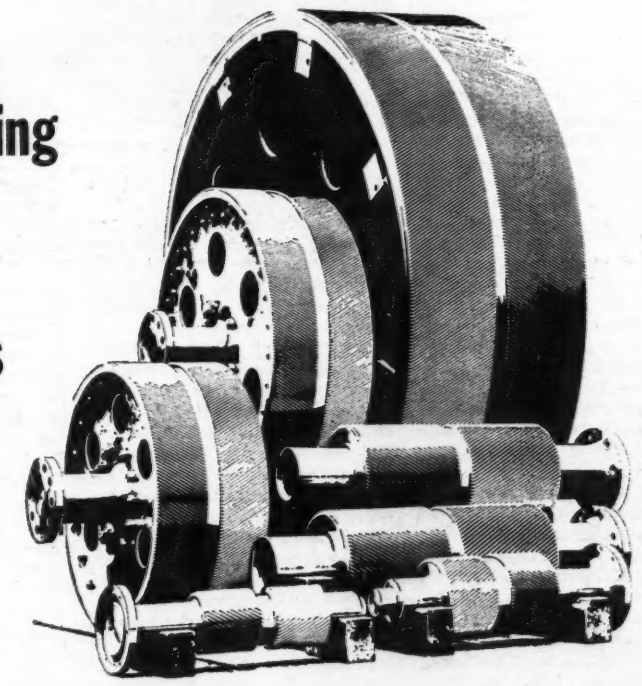
"In the fields of pneumo-and hydro-automation we are not only marching in step with foreign scientists but in certain respects we are actually ahead of them."

This was the claim recently made by Professor M.A.Aizerman of the Institute of automation and Telemechanics, Moscow at the Fourth All/Union Conference — Seminar on Pneumo — Hydraulic Automation.

The meeting was attended by 321 delegates representing 97 organisations engaged in this field of work.

A new universal system of elements for industrial pneumo-automation was described.

gearing for ships



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THESE CABLES MUST SUPPORT 20,000 TONS

New system of spinning used on the £16m. Forth Road Bridge, due to open in 1963

CABLES which will support a dual carriageway and its traffic are now being spun by a system new in Europe on the £16 million Forth Road Bridge.

The bridge is scheduled to open in 1963, and the cable spinning is considered a difficult phase in the 3¼ years' construction work. Two main suspension cables will each consist of 11,618 wires of galvanised high tensile steel. When completed they will be about 22¼in. thick.

These cables are being hauled over the tops of two 512ft. high towers, the side towers and splay saddles, and secured in deep concrete anchorages, where the wires are divided into 37 groups.

On this bridge some 30,000 miles of wire weighing 6,350 tons have been made by Dorman Long (Steel) of which 1,500 tons have been delivered to the southern end of the bridge at South Queensferry in 10 cwt. coils. The remainder is being stored at Middlesbrough.

—by—
OUR SPECIAL CORRESPONDENT

In the reeling-shop at South Queensferry the coils are loaded on to swifts by pillar cranes and reeled through tensioning devices on to big drums. Each of 90 drums is capable of taking seven tons of wire.

The individual coils are spliced together in a 200-ton press.

The loaded drums of wire are then mounted in turn on eight unreeling machines set up behind the south anchorage and from there the wire passes through a counterweight tower, to ensure equal tension, and on to the spinning wheels that carry them over the span.

Before the spinning could start, temporary footbridges or catwalks had to be erected across the river, about 4ft. below the level of the main cables.

Each catwalk is 9ft. wide and is supported by ten strands one-inch thick, eight of which carry the wire mesh floor, and the other two the wire mesh parapets.

During the spinning of the cables along the length of the bridge between 50 and 60 men are stationed at 400ft. intervals along the two 6,000ft. catwalks.

They adjust the wires as they are laid against a fixed guide wire—thus ensuring that the wires all have the same sag in the main and side span.

Mr. H. Shirley Smith, site agent of the A.C.D. Bridge Co.—a consortium of three main contractors—said recently: "You could put Waterloo Bridge under one of these 1,340ft. side spans and forget all about it."

Mr. Smith explained something of the human achievement and endurance of these steel erectors who work 500ft. up, often with the wind gusting up to 50 m.p.h.

He said that for eight nights last month some of his engineers were out there from 7p.m. to 4a.m. The men work two shift systems, 8a.m. to 5p.m. and from 4p.m. to midnight.

He said: "When you are up there you have got to stay there. You cannot leave for a tea break or a meal break or for cigarettes. There is no shelter. You have to work on through all types of weather.

"You can imagine that to get men to work under these conditions required a lot of negotiations with the unions concerned . . . but our labour relations have been friendly; indeed we could not achieve this without the willing co-operation of the men."

The engineers, who are in charge of the work, have as part of their duties to take the temperature of the bridge each night. The final adjustment of the cables can be carried out only when they are unaffected by variable daytime temperatures.

An error of one degree at this stage would make a difference of half an inch in the elevation of the main traffic deck, which will weigh 20,000 tons, including 16,000 tons of structural steel.

There will be two 24ft. wide roads forming a dual carriageway, and on either side two 15ft. wide tracks each divided into a 9ft. path for cyclists and a 6ft. path for pedestrians.

Toll charges are being worked out. The bridge will have no speed limit or weight restriction and is unlikely ever to suffer closure from high velocity winds.

The structural steel work is cleaned by grit blasting, metallised with a coat of zinc, and protected by four coats of paint.

The processing of the steel is said to ensure that it will not require painting for a further 12 to 15 years.

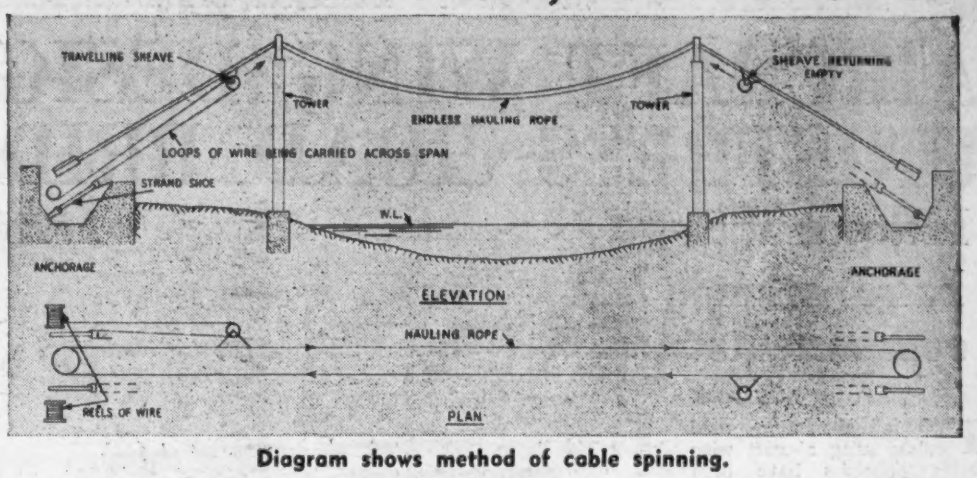


Diagram shows method of cable spinning.

Four bights of wire leave the south side of the new Forth Road Bridge to be carried over side and main towers. A total of 11,618 wires will be passed over the bridge before completion.

ANTI-SNOW ROADS IN LONDON

BURIED electric cables will keep dual carriageway on the Piccadilly and Knightsbridge approaches to the Hyde Park corner underpass clear of snow and frost.

Detectors embedded in the roadways and automation equipment housed in a special roadside cubicle will automatically switch the electric power on before snow and frost have a chance to form.

Much of the research work on the detectors has been carried out by the Road Research Laboratory and the complete system has been developed and made by Honeywell Controls of Greenford, Middlesex.

Three detectors

Three types of detectors are used: One which depends on the change of resistance between electrodes set in the road surface when it becomes wet, operates when snow falls on the road; the other two work together so that when there is moisture present and the temperature falls below 35° F, the power is switched on.

Similar schemes are under consideration for the Great West Road, London, the Birchfield Road underpass in Birmingham, and Chapel Hill, Leeds.

Last winter a successful scheme of this kind was put into operation at The Mound, Edinburgh.

In this installation, a total of 54,000sq.ft. of roadway is heated

SPACE HEATING USED IN RUBBER DEPOT

TO ensure sensitive control of temperature and rapid warm-up, space heating by ducted hot air has been installed in a depot storing crude rubber.

The heating unit used is a Thermobloc oil-fired heater manufactured by the Watson Co. of Borehamwood, Herts.

It consists of a vertical cylinder with burner unit, tubular heat exchanger, a combustion chamber and integral blower unit.

Heating air is isolated from combustion air by passing the inlet through one of the external walls, all other openings being enclosed by brickwork, including the Thermobloc unit.

The effectiveness of the system and its rapid temperature recovery ability is shown by the negligible heat drop which occurs when the main access doors are left open for some time. After closing, a 20°F gain can be made in about 20 minutes.

Electrical needs of the large unit are a 5h.p. motor for the fan and a ½h.p. for the oil-firing unit.

Circulation is about 15,000cu.ft. of air per minute with a heat output of 1,300,000 B.Th.U. per hour. For an average fuel consumption of 4½ gall./hour a temperature rise of about 86°F is obtained and in the rubber store the thermostat is set to give a mean of 130° ± 2½°F.

Cadmium sulphide cell detects blemishes

USING a highly sensitive cadmium sulphide cell as the sensing device, an equipment for detecting pinholes and blemishes in metal strip has been developed by Hird-Brown of Sale, Cheshire.

Coupled to suitable controls, the unit will operate on a continuous process line, and a battery of cells in parallel can be varied in number to suit different widths of material.

When working, the equipment is mounted opposite a continuous light source so that any variation of light striking the cell changes its conductivity which is signalled through the control unit.

The size of pinhole that can be detected is related to the opacity of the material being monitored, its width and the rate of travel.

At a speed of 100ft. minute and for a width of 5ft., holes of 1/32in. will be indicated.

Ford say yes to axle conversion

THE York trailing axle conversion manufactured by Ford Motor Co. has been approved for their Thames Trader 7 and 7½ ton models.

The York conversion consists of a trailing axle, comprising two independent oscillating rocker beams, attached to the chassis by hanger brackets.

These are connected to the driving axle suspension through a special shackle linkage. Hanger brackets are located transversely by a tubular cross member.

This independent system is said to give excellent articulation, eliminates axle hop, and balances braking torque. When fitted a maximum gross vehicle weight of 15 tons is permissible.

Ford recommend that vehicles fitted with this conversion should be equipped with power steering and a five-speed direct drive gearbox, offered as production options.

Conversions will be carried out at York trailer depots in London, Glasgow, Warrington and Corby.

THIS WEEK IN PARLIAMENT

MP issues a statement on marine research report

BY OUR OWN CORRESPONDENT

AN MP called in the Commons for a Government statement on the action which had been taken on the recommendations of the report on research and development requirements of the shipbuilding and marine engineering industries.

Mr. Denzil Freeth, Parliamentary Secretary for Science, said that action was being taken on the recommendations as follows:

A review of the arrangements for carrying out research in the shipbuilding and marine engineering industries was nearly completion and the formation of a new British Ship Research Association had already been announced.

An economic and technical study of research and development needs in the field of marine engineering was well advanced. This was being carried out by the DSIR and the Transport Ministry with the full co-operation of marine engine building firms and the research associations.

A production research team set up nearly a year ago had already conducted an industry-wide survey of techniques and methods in hull contruction.

Consideration of development contracts awaited the formation of the new Research Association and the outcome of the two surveys referred to.

The General Council of British Shipping had recently announced its intention to accept an invitation to join the Research Association and also to institute a review into the shipping industry's own research requirements.

* * *

Despite recent unofficial strikes, Mr. John Hare, Minister of Labour, was able to report to MPs that he was satisfied that "real progress" has been made towards improving relations in the motor industry.

He said that in his latest talks this month with employers and trade union leaders both sides reaffirmed their determination to secure observance of constitutional methods for settling disputes.

They had acted in accordance with this determination since the issue of a joint statement on the subject last April.

A further meeting between the Minister and the two sides has been agreed for next year.

* * *

Among economy measures in his department decided upon by the Labour Minister and aimed at saving about £800,000 during 1962-63 are:

1. The Technical and Scientific Register at headquarters is to be discontinued, but the Professional and Executive Register at selected local offices will be available to persons with technical and scientific qualifications, and to employers.

2. The Government Training Centres at Kidbrooke and Long Eaton will be closed. Certain classes at other centres with inadequate attendance will also close, but all first year apprenticeship classes will be retained.

3. The Minister intends to start charging employers fees for the training services his department provides. Fees will be charged in the next financial year for Training Within Industry (T.W.I.) courses and for instructors courses at the Ministry staff college at Letchworth.

* * *

Mr. Anthony Barber, Economic Secretary to the Treasury, offered to look into details of any cases sent to him of delay by the Customs authorities in examining machinery and parts returned by customers overseas for reconditioning in the UK.

He said, when an MP raised the question, that every effort was made by the Customs to ensure the expeditious clearance of such machinery and parts.

.....FOREIGN NEWS.....FROM OUR OWN CORRESPONDENTS....

AIRCRAFT WING DESIGN FOR UNISTRESS ROAD BRIDGES

Inexpensive basic beam components

NEW YORK

TWO all-aluminium road bridges using aircraft wing design principles have been erected near Amityville, New York.

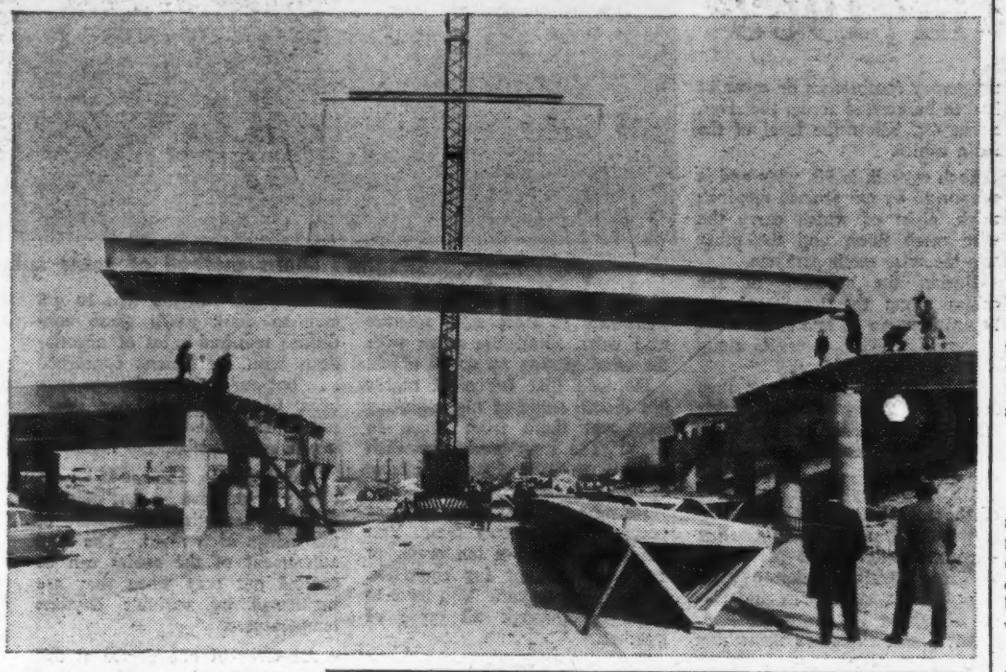
Components were manufactured by the Traveler Manufacturing Co. of Frankfort, N.Y., and site erection was under the direction of the Kaiser Aluminum and Chemical Corp, of Oakland, California.

First of its kind

Called a Kaiser "Unistress" bridge, it is claimed to be the first of its kind. Triangular shaped beams made from aluminium sheet are supported by aluminium extrusions and joined edge-to-edge to form a deck measuring 212ft. in length and 90ft. wide. Paving is applied to the decking after erection.

Design rights are held by Kaiser Aluminum, who say that the basic beam components are easy and relatively inexpensive to fabricate and erect.

This type of construction gives a very high strength-to-weight ratio, and greatly reduces the dead structural weight of conventional designs.



The first Kaiser Aluminum unistress bridge under erection near Amityville, New York. This aluminium semi-monocoque structure using aircraft wing design principles greatly reduces structural deadweight. A second bridge will be erected shortly at Amityville.

Another feature is the corrosion resistance of the material and consequent lack of maintenance.

Britain wins prizes at film festival

BUDAPEST

BRITAIN was represented by entries from more than twenty firms and organisations at the 2nd International Festival of Technical and Scientific Films held in Budapest last month.

Prize-winning film in the Production Processes classification was "Drop Forgers in Steel" produced by the English Steel Corporation. Tht British Iron and Steel Federation also scored a success in the Accident Prevention Section with its film "Hazard".

Over 260 films from twenty-one countries were shown at the festival, which was organised by the Hungarian Society of Mechanical Engineers. Screening of the large number of entries before an international jury took five days, the first film of the day being shown at 8 a.m.

Awards were made for five different classifications of film subject. Entries were also grouped according to their purpose.

Steel sheet exports

TOKYO

GALVANISED sheet and coil steel produced by a new continuous line process is to be exported under the name of Leonite by the Nippon Kokan Kaisha. The new method has made possible a considerable reduction in production costs.

The galvanising line at the Mizue works has an extra-long heat treatment furnace, giving the product good formability. The quality standard is high and the formation of rust is retarded by chemical treatment.

The technique is used as the result of a technical aid agreement concluded with the Armco Steel Corporation of U.S.A.

Passenger conveyors in tunnel

ROTTERDAM

CONSTRUCTION of the £7 million Benelux Tunnel under the New Waterway running from the Hook of Holland to Rotterdam Harbour began this month and will take four years to complete.

It will be one mile long and consist of two tubes each of eight sections and each carrying a double roadway 23ft. wide and room for a subsequent railway track.

Pedestrians and cyclists will be carried through the tunnel on non-stop conveyors.

Private finance

The tunnel will run about 45ft. below sea level and will be constructed by private contractors under the supervision of the Dutch Ministry of Waterways.

The Dutch Government's plan for such a tunnel would not have matured until 1980, and so 19 large industrial firms, three banks, and the Municipal Councils of Rotterdam, Vlaardingen and Schiedam decided to save 19 years by forming the private Benelux Tunnel Company to finance the project.

A toll of two shillings per vehicle is expected to pay for the construction within 20 years, when the tunnel will be handed over to the Government for a nominal payment.

GAMMA TEST ON BRONZE BUDDHA

TOKYO

INVESTIGATING the condition of the great Buddha statue at Kamakura, near Tokyo, formed the subject of an unusual paper presented to the recent 4th Japan Conference on Radioisotopes.

The hollow bronze statue, which stands 36ft. high, was made about 700 years ago and it was feared that further earthquakes near its location might cause the neck to collapse.

A gamma radiographical study of the whole structure was made, and in addition to revealing a few faults which arose during casting, it was possible to deduce some of the ancient techniques employed.

Since it was impossible to melt enough bronze to cast the complete statue it was done in several stages from the base upwards.

Clay moulds were set to form a gap which was later filled with molten bronze. Soil was then heaped up around and as high as the moulds.

The method

Bronze was melted in a number of furnaces set on the hill formed and conveyed to the gap through troughs.

When the first section had set, the process was repeated for the remaining sections till the statue was complete.

The wall thickness of the casting varies from less than ¼in. to more than 4¼in., the average thickness being about 2in.

The gamma-ray radiographical investigation showed clearly that the simple "casting-on" method results in imperfect fusion of the cast bronze at the junction plane.

NASA's 3-MAN SPACECRAFT

NEW YORK

The National Aeronautics and Space Administration have selected The Boeing Co. to develop the first stage of an advanced Saturn rocket designed to carry the three-man Apollo spacecraft around the moon.

The contract will be worth more than $300 million.

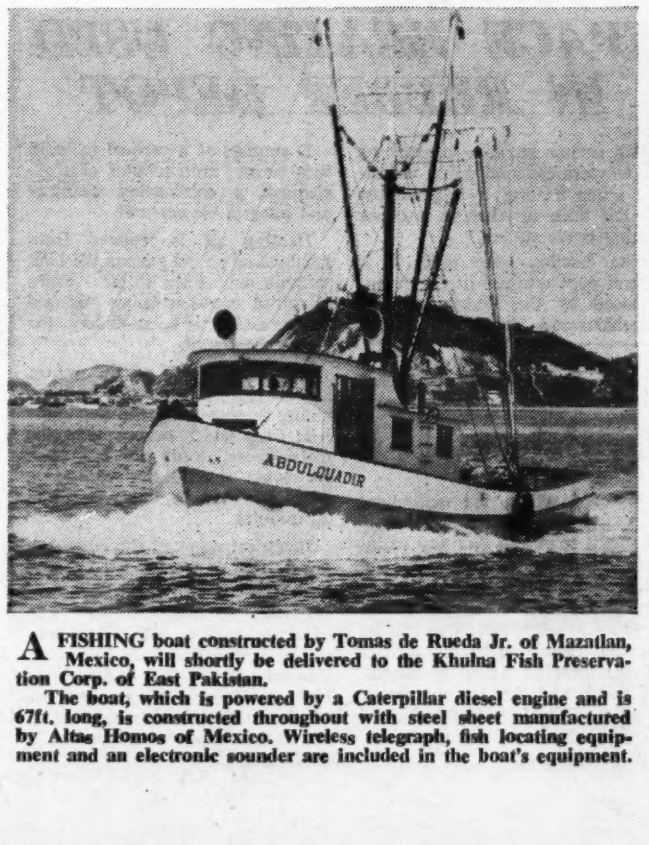
CUTTING TEST CRITICISED

WASHINGTON

In a research report made at a recent meeting of the American Society of Mechanical Engineers, an industrial consultant, Mr. W. A. Mohun, warned against excessive reliance on the initial cutting rate in quality control work on abrasive disks.

This test is frequently used for quality control testing.

DIESEL FISHING BOAT BUILT FOR EAST PAKISTAN



A FISHING boat constructed by Tomas de Rueda Jr. of Mazatlan, Mexico, will shortly be delivered to the Khulna Fish Preservation Corp. of East Pakistan.

The boat, which is powered by a Caterpillar diesel engine and is 67ft. long, is constructed throughout with steel sheet manufactured by Altas Homos of Mexico. Wireless telegraph, fish locating equipment and an electronic sounder are included in the boat's equipment.

Computers work out tool programmes for U.S. industries

CHICAGO

AUTOMATIC programming for numerically-controlled machine tools is now available to all American industries.

Designated APT (Automatically Programmed Tools), the method has until recently been restricted to the aviation and aerospace manufacturing fields.

Developed by the Aerospace Industries Association, APT is a digital computer routine which translates English language directions into a sequence of instructions on perforated tapes for acceptance by the tool.

Origin at MIT

The advantages of the system are: improved quality control; more economical short-run production; quicker production change-over; and machinists can be switched to formulating forward programmes.

APT originated at the Servomechanism Laboratory of the Massachusetts Institute of Technology in 1952 in a pilot model study under sponsorship of the U.S. Air Force.

In 1955 a prototype APT system was coded for the Whirlwind Computer to demonstrate feasibility. This rudimentary version required the part programmer to specify the end points of each straight line cut to be performed by the machine tool.

Joint effort

Development of an actual working model was undertaken in 1957 in a joint effort on the part of member organisations of the Aerospace Industries Association under the co-ordination of M.I.T.

This activity resulted in the 1958 release of a programme for the IBM 704 computer, which was designated the APT II, Phase I system.

This system relieved the part programmer of the responsibility of computing successive cutter locations approximating a desired space curve and enabled him to describe the curve in a natural computer language resembling common English.

In June, 1958, co-ordination of this joint effort was assumed by the APT Project Co-ordination group of the AIA Numerical Panel, and a considerably improved version of the system, designated APT II, Phase II, was released in June of 1960.

Programmed for the IBM 709 and 7090 computers, this system has been used with considerable success by many aerospace companies.

The new APT III system is a more sophisticated version of the system and contains many new features.

Future development

In September of 1961, the AIA selected Armour Research Foundation and Illinois Institute of Technology to assume full responsibility for APT III after December and to direct its future course in the APT Long Range Programme.

The Foundation technical staff is now pursuing the further development and expansion of APT capabilities to realise fully all the benefits this system holds in store for improving manufacturing methods.

U.S.-SWISS EXECUTIVE AIRCRAFT

CLEVELAND, OHIO

LANDING gear for a new twin-jet executive-type aircraft the SAAC-23 which is soon to go into production in Switzerland, will be manufactured by Cleveland Pneumatic Industries Inc.

The firm will ship 25 sets of landing gear, including retraction actuators and shimmy dampers to the Swiss American Aircraft Corporation of St. Gallen, Switzerland.

Swiss American Aircraft was organised last year by Mr. Lear, founder and chairman of Lear Inc., of Santa Monica, California, which specialises in aircraft radio and navigation equipment.

Some of the plane's components will be bought in Europe. The aircraft can carry eight people and cruise at 500 m.p.h. for 2,000 miles.

Wide strip mill ready

STOCKHOLM

A SEMI-CONTINUOUS wide strip mill with a capacity of 100,000 tons a year and a new cold rolling mill will shortly be put into operation at Domnarfvets Jernverk, the steel mill of the Stora Kopparberg steel and forest industry group. Work started on the plant in early 1959 and it is expected to cost £7 million.

Producing strips 65 in. wide, nearly 50 ft. long, and 3 mm. thick, the hot rolling mill may also be used for producing medium plate in widths up to approximately 100 in. wide and in thicknesses down to 5 mm.

The cold rolling mill will process strips from the hot mill into sheet down to 0.4 mm. thick.

PLANT DESIGN ADVANCES RAISE STEEL OUTPUT

by
E. F. WOOLDRIDGE
MIMechE
Research and Development Dept., The United Steel Companies

DURING the period 1945-60 the production of pig iron and crude steel in this country has roughly doubled, yet overall fuel requirements per ton of steel have been reduced by about 15 per cent and productivity in terms of output per man year has increased by almost 50 per cent.

This increase in output and efficiency can be largely attributed to the investment of about £1,000 million in new plant during a period which has been characterised by the intensive application of scientific knowledge to the improvement of plant and processes.

A characteristic feature of iron and steel production is the great bulk of the materials used, which for an integrated works can amount to anything from 3 to 5 times the tonnage of the finished products.

The most important raw material is iron ore and resources of rich ores are becoming exceedingly scarce. The richest home ore deposits have, in fact, already been largely worked out and present reserves, mainly centred in the East Midlands, are low in iron content, i.e. of the order of 25 per cent Fe.

The industry is now having to rely to a considerable extent on imported ore which comes mainly from Sweden, North Africa and Canada. To move the large imports (i.e. about 15-million tons per annum) efficiently and cheaply the industry has arranged for the provision of specially designed ore carriers, and ore unloading facilities at United Kingdom ports have been progressively improved.

Burden preparation

In recent years increasing attention has been devoted to the crushing and size grading of the burden and the bedding of blast furnace materials to improve their homogeneity.

Fine iron ores are now usually sintered though the process of pelletising is also used, particularly for the agglomeration of fine concentrates.

It is a significant fact that the increase in pig iron production during the period under review has been achieved without any substantial increase in the number of blast furnaces in operation and an outstanding feature is the growth in the size of the furnace. Whereas 15 years ago there were no furnaces in this country of over 25ft. hearth diameter there are now several furnaces with hearths of the order of 30ft. diameter, each producing over 1,000 tons per day.

The benefits obtained from improved methods of burden preparation and increased furnace size have led to the development of techniques for injecting fuels and oxygen or steam into the furnace hearth through the tuyeres. Associated with fuel injection is the need for higher blast temperatures and temperatures as high as 1,000°C are now being achieved.

Continuous hot strip mill.

Due to increasing power requirements the steam or gas engine driven reciprocating blowers formerly used have largely been superseded by steam turbine driven rotary blowers in modern installations.

Steel is most commonly made in open hearth furnaces, converters and electric furnaces and in this country more than 85 per cent of the steel produced is still made by the open hearth process. There is already a trend, however, towards the use of electric arc furnaces for remelting and a revival of pneumatic processes for converting molten iron into steel.

Cheaper oxygen

There is a growing use of oxygen in varying degrees in all steelmaking processes. This has been largely brought about by the development of oxygen making processes to supply oxygen in gaseous form in bulk quantities (known as tonnage oxygen) at much lower cost than for normal liquid oxygen supplies.

The advent of cheap oxygen has not only given fresh impetus to established steelmaking processes but has also given rise to new ones such as the L.D. and Rotar processes.

Recent developments in vacuum melting and casting techniques may well have far-reaching effects on future steel-making practice and steel quality. Steel melted in vacuum furnaces has a lower rate of non-metallic inclusions and a lower gas content than steel from conventional furnaces and this is particularly important when producing special steels for highly stressed components.

Seventy-ton electric arc furnaces with ladle in position ready for tapping.

Continuous casting

One of the most revolutionary changes in steelmaking techniques during the period under review has been the introduction of continuous casting of slabs and billets. This process makes it possible to proceed directly from molten steel to semi-finished product, thus eliminating ingot casting and stripping as well as such expensive items of plant as soaking pits and primary rolling mills.

The most important development in the rolling of steel has been the growing use of continuous and semi-continuous mills which give higher quality products, better yield, higher productivity and lower production costs.

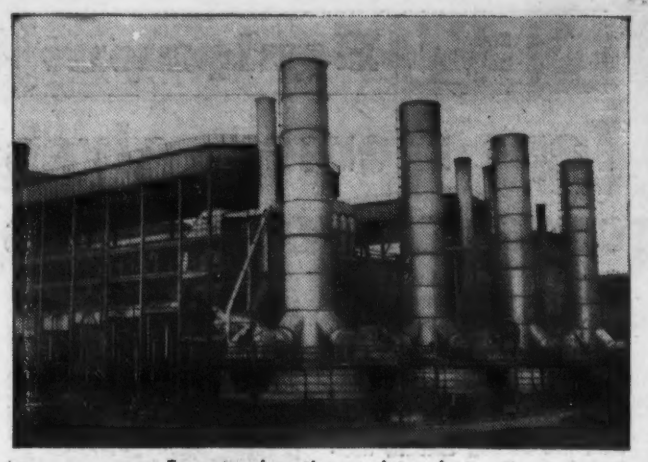
Considering first the heavier types of mill, usually known as primary mills, recent developments have led to the introduction of the universal slabbing mill which is provided with vertical edging rolls in tandem with the main horizontal work rolls.

For wide plate rolling, the 2-high mill which has been in service in this country for many years is gradually giving way to the 4-high mill in which relatively small diameter work rolls reduce the load on the mill, while large backup rolls restrain the tendency of work rolls to bend.

Individual drives

In order to increase the productivity of mills and to improve their flexibility, individual motor drives for each stand, and in the case of blooming and slabbing mills even separate motors for each roll have found increasing use.

An important development in the construction of billet mills has been the provision of alternate horizontal and vertical stands, thus avoiding the need to twist the billet between successive passes.



Four strand continuous sinter plant.

It will be appreciated that the continuous mills are intended for high outputs and during the period under review two new types of mill have been introduced for the production of hot rolled strip where the tonnages involved are relatively small. One of these is the planetary mill which is quite revolutionary in operation and consists of two large horizontal rolls around which are spaced many smaller diameter rolls.

In competition with the planetary mill the hot Steckel mill aims to produce thin strip from a slab in a single stand 4-high reversing mill. This is accomplished by installing hot coilers in furnaces on either side of the mill to prevent rapid cooling.

Automatic control

The industry is attempting to keep in step with the developments which are taking place in automatic control systems and applications of automatic control can already be found throughout all the processes, e.g. position controls are being applied to mechanical plant and programme controls to repetitive operations.

The future development of reliable instruments will facilitate the application of automatic controls to give better utilisation of plant and closer control of product quality, with continuous processing under computer control as the ultimate objective.

This article is based on a paper, entitled **Some Engineering Aspects of Recent Developments in the Iron and Steel Industry** *read by Mr. Wooldridge at a recent meeting of the N.E. Branch of the Institution of Plant Engineers.*

HIGH-SPEC. CONTROL ON LARGE EXTRUDER

AN order has been placed with Fawcett Preston and Co., for a 6in. extruder for installation in the works of British Insulated Callender's (Submarine Cables).

The order is unusual in that it calls for a Davis-Standard Mark I machine, although this has been superceded, and the quality of the temperature control system is to an unusually high specification.

Under normal conditions these extruders are supplied with the proportioning type of temperature control, but this order calls for extensive use of West JSB Stepless Controllers, comprising saturable core reactors, driver units and pyrometric instruments.

Apart from the fine variation of input according to the heating demand and virtually straight-line control, this method is more reliable, particularly on long runs because of the lack of mechanical switching.

The machine employs two head and four barrel zones, locking ring and die, the heating of which is controlled by the reactors.

The three rear barrel zones have 7kW heating, the final zone 9½kW, 1½kW of which is required for the breaker plate and the head zones 2kW and 3kW respectively. The locking ring is rated at 3kW and the die at 1½ kW.

Dual iron/constantan thermocouples placed at deep and surface positions sense and present a mean barrel heat to the control instruments and additional thermocouples wired to a recorder are specified for each zone.

Temperature record

Temperature of the die, locking ring and all zones will be recorded but only single thermocouples are used on the die, locking ring and two head zones.

Because of the weight of the machine, special attention has been paid to the cabinet. This will be a basic frame on which the reactors are mounted and will be installed first.

The remainder of the cabinet, driver units and panels for instruments and recorders will be assembled as a separate structure, dropped over the base frame and connected to it.

WORLD STANDARDS

SAFETY and reliability of boilers was the subject of a four-day international discussion in Milan at the beginning of this month when Sub-Committee 2 of Technical Committee ISO/TC 11—Unification of Boiler Codes of the International Organisation for Standardisation (ISO) met to complete the drafting of Recommendations for the strength of pressure parts, for the Design Section of the proposed International Boiler Code.

Meeting under the Secretariat of France, 50 delegates from Belgium, France, Germany, Italy, Netherlands, Switzerland, the U.K. and U.S.A. reached agreement on proposals to be submitted for approval by the Technical Committee at a meeting fixed for April, 1962, in Germany.

One of the most important decisions taken was the acceptance by five nations including the U.K. (with Belgium, Switzerland and U.S.A. against) of a safety factor of 2.7 on the minimum ultimate allowable tensile stress for the part being designed.

This recommendation, if accepted, will allow the engineer to use higher design stress in his design calculations resulting in a saving in materials and a reduction in the cost of manufacture of the boiler, allowing the U.K. to compete in international trade more favourably than hitherto.

The International Boiler Code covers rules for construction of fired steam boilers for stationary service. A pressure vessel in which steam is generated for use external to itself is also classed as a boiler, but the Code is not applicable to boilers having less than 5½ gal. capacity or less than 17.2 lb./sq. in. design pressure. Rules apply to the boiler proper from the feedwater inlet connection to the steam outlet connection.

* * *

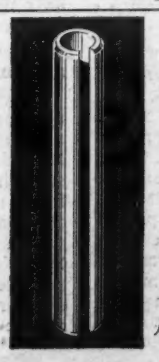
TO assist the Standards Engineer in the application of standards in industry and to impart a general understanding of the subject to management, a course of six weekly lectures have been arranged by the Department of Engineering of Watford Technical College, commencing on January 24, 1962.

Although the main theme of the lectures has been based on the application of National Standards and their importance to industry as a whole, the importance of International Standardisation and the part it will play in the unification of European Standards of Members of EFTA and the European Common Market has not been ignored, and one lecture will be devoted entirely to the work of the International Organisation for Standardisation (ISO).

Opening the series will be Dr. H. M. Glass, Technical Director of British Standards Institution, with an "Introductory Talk on Standardisation", and other lectures will be given by Members of the B.S.I. Technical Staff and standard Engineers from Industry.

Those wishing to attend should write to the Registrar, Watford Technical College, Hempstead Road, Watford.

USE GROVERLOK SPRING TENSION PINS



Where you would have used solid taper or parallel pins.

Groverlok pins give positive security. No reamering or special accuracy in drilling is necessary before fitting.

Groverlok pins are manufactured from high-carbon, cold-drawn steel strip . . . have a constant chamfer . . . are heat treated to give maximum efficiency.

Send for samples — state diameter and length

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BRITANNIA WORKS, CARPENTERS ROAD, STRATFORD, E.15
Phone: Maryland 4342-3 : Grams: "Adopted Easphone" London

NEW Equipment

Tape memory gives data in two seconds

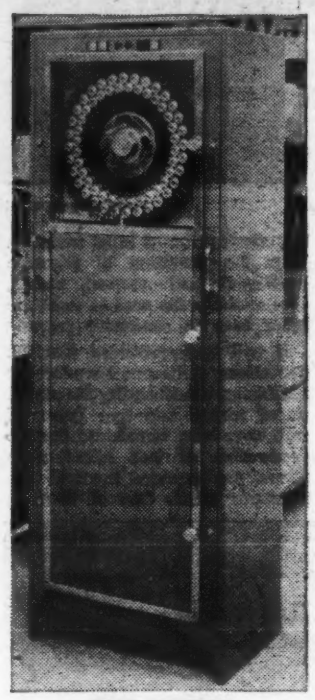
FACTI'S Carousel is a new type of random access magnetic tape memory and differs radically from other memory machines previously available. When full it contains more than three million checked alphanumerical characters or more than five million checked decimal digits. The average access time for a block of information is about two seconds.

Sixty-four reels, each containing approximately 29½ft. of ½in. magnetic tape, are located peripherally on a platter which can be rotated in either direction and when a particular reel is selected, the platter rotates to bring it to the operating position by the shortest route. Once in position the tape is wound past the read/write head and all reading and writing is performed.

The flexibility of the 64-reel system confers several advantages. There is no need to search through hundreds of yards of tape for the required information; small reels give swift tape acceleration and deceleration without complicated tape handling systems; considerable time is saved in obtaining data. Platters can be exchanged in about 10 seconds and reels in about 15 seconds.

The unit contains all the electronic circuitry needed to address the chosen reel, read or record on tape, unwind and rewind and control the movement of the platter. It is designed so that all mechanical and electronic sections are mounted in a single unit which can be drawn forward on guides for servicing. The circuitry is transistorised and mounted on printed circuit boards and the complete unit can be provided to operate from any standard supply. Power consumption in standby position is 300 watts and during tape handling is 750 watts. U.K. agents for this equipment are: **The Electronic Apparatus Division of Associated Electronic Industries Ltd., Crown House, Aldwych, London W.C.2.**

Reader service reference No. 401



TAPE MEMORY
High speed operation

Electric truck

Pedestrian controlled, the RM.1 electric truck has a capacity of 1,120lb. and has a maximum speed of 4 m.p.h. It is propelled by a 24 volt d.c. geared motor, powered by a 12 cell Kathanode traction battery of 90Ah. capacity, and a full working life of eight hours is available from one charge.

When the operating handle is in the up position, the truck is parked with the brake applied. As the handle is moved downwards the truck accelerates smoothly up to the maximum speed.

Platform dimension are 4ft. 3in. by 3ft. 6in. and pneumatic or cushion tyres are available at no extra cost.

Extras include detachable sides, special pallets and a raising platform which enables the truck to pick up its own pallet. A transistor control system, eliminating the power loss in conventional resistance controllers, and a variety of bodies are also available.

Two larger versions are going into production: one has a capacity of 1,350lb. and the other 1,680lb. Bodies suitable for various applications are also available as extras. **The Richard Maurice Equipment Co., Portsmouth Road, Cobham, Surrey.**

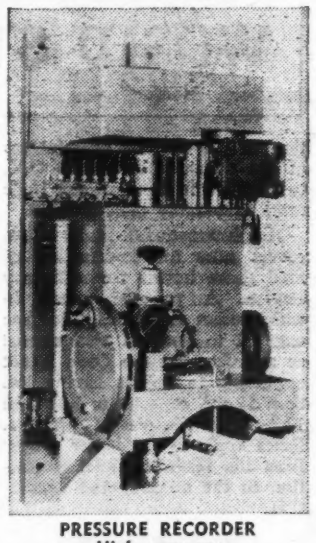
Reader service reference No. 402

Turn to page 15 for Classified Advertisements and read about . . .

Machinery for sale
Capacity available
Business opportunities
Agents and Trade Services

Pressure recorder

The Reid pneumatically operated automatic pressure recorder is claimed to produce substantial savings in time and labour as well as more accurate results than are obtainable by conventional methods. It is calibrated for vapour pressures from 2lb./sq. in. to 18lb./sq. in. and may be used



PRESSURE RECORDER
High accuracy

for examining the volatility of different grades of petrol or, for example, the purity of methyl alcohol and other volatile liquids.

There are two standard models. One for determinations from a single sample line and the other for sampling from two lines alternately. The single line model records at intervals of 12, 15, 20, 30 or 60 minutes and the two line model, a rate of two recordings per hour is recommended, to enable all traces of the first sample to be cleared from the apparatus.

The equipment is 36in. high, 21in. wide and 21in. deep and the total weight is 330lb. The standard pressure recorder which is part of the equipment supplied, can be mounted up to 50 yards from the main unit and this distance may be increased by the addition of a pneumatic pressure booster.

The sequence of operations is controlled by a timing mechanism, driven by a flameproof synchronous motor, which actuates the relay valves to supply compressed air to the operative valves.

The equipment requires 110 V or 230 V a.c., 40, 50 or 60 cycle single phase electric supply and a flow of clean air, free of oil mist, at a maximum rate of 1½ cu. ft./min. and a minimum pressure of 25lb./sq. in. **Nash & Thompson Ltd., Hook Rise South, Tolworth, Surbiton, Surrey.**

Reader service reference No. 403

100 h.p. shearer

The Trepan Shearer, designed to improve product size, is claimed to give both larger coal and fewer fines. In principle, a web of coal is cut by the trepan head and the shearing drum follows to remove top and bottom coal. The trepan unit can be geared to give 45, 50.5, 56 or 69 revs./min. and heads of 28in. and 35in. diameter are available.

For dust supression, water spray nozzles are fitted on the front of the Magnamatic transmission unit for the trepan head and on the pulley bracket attached to the shearing unit for the drum.

The Buxton FLP certified water cooled motor is continuously rated at 100 h.p. and is suitable for a 3 phase, 50 cycle supply. The shaft speed is 1,465 r.p.m. and the motor can be wound for voltages between 400 and 650 V. The winding is equipped with thermostats which operate at 120°C and reset at 95°C.

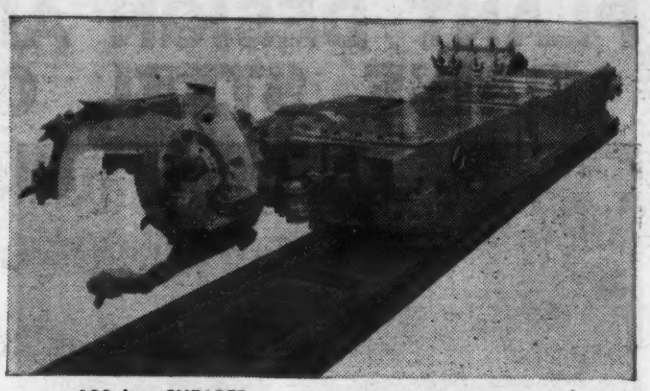
Controls are power-assisted and so arranged that, following a stoppage, the manual speed setting is automatically returned to zero. A built-in heat exchanger maintains the oil at a low temperature. **British Jeffrey-Diamond Ltd., Stennard Works, Wakefield.**

Reader service reference No. 404

Control amplifier

The Dawe vibration control amplifier type 1437 is primarily intended for controlling the drive to a vibration generator in order to maintain a preset vibration level. Constant acceleration, velocity, displacement or a combination of the vibration characteristics can be obtained. The range of the type 1437 is 5 c/s to 5 kc/s to match that of the automatic L.F. sweep oscillator type 444. These two instruments can be used for many vibration studies and component endurance tests.

The vibration control amplifier



100 h.p. SHEARER
Power assisted controls

consists of two major sections; a controlled amplifier whose gain is varied by a direct voltage and a preamplifier which amplifies a reference signal from an accelerometer mounted on a vibration generator.

Provision is made for connecting external filters to modify the constant acceleration characteristic and an amplified output signal is available for monitoring purposes. **Dawe Instruments Ltd., Western Avenue, Acton, London W.3.**

Reader service reference No. 405

Cable tracer

This transistorised instrument will locate conductors and cables buried under plaster or run underground. A further use is the pinpointing of breakages and short circuits in cables and conductors.

The instrument uses the alternating voltage produced in an inductive or capacitive pick-up to locate the path of a conductor, and this is measured on the indicating instrument after suitable amplification.

Using the inductive method, a single conductor carrying a current of approximately 1 amp can be located with certainty at a distance of 40in. A twin conductor, having a core separation of 5/16in., can be located at a distance of 6in. With the capacitive method, a conductor carrying 220 V a.c. can be positively detected at a distance of 4in.

For use in conjunction with the cable tracer, a signal generator is available to carry out circuit checks where no a.c. can be taken from the mains, where a powerful external field of the same frequency complicates the measurement or where the circuit in question is close to other conductors carrying a.c.

The generator converts direct current, supplied either by four torch batteries or an external accumulator, into a 5A alternating current or into a high alternating voltage and the unit works at a frequency of about 1,000 cycles per second. **Metrix Instruments Ltd., 254 Victoria Road, Surbiton, Surrey.**

Reader service reference No. 406

Power source

The Lincoln CVR 200 constant voltage selenium plate d.c. rectifier for CO_2 welding was primarily designed for use with the Sprite welding unit and other automatic welding processes.

Basically it consists of a 3 phase natural air-cooled constant voltage transformer rectifier providing a voltage range of 14-30 volts d.c. and a continuous output of 200 amps at 25 volts with an input of 415 volts. Fine voltage selection is provided in a series of 16 steps ensuring accurate voltage control to meet any arc characteristic. Two selector switches enable the required voltage to be selected in steps of approximately 1 volt.

An important feature is the fitting of a special variable stabiliser. This ensures a smooth arc characteristic and gives any added inductance necessary to minimise spatter loss.

The complete unit is of all-welded steel construction and is mounted on castors with 5in. diameter hard rubber wheels for easy movement.

In addition to the standard unit, a special version combining the CVR 200 with the Sprite CO_2 welding unit has been developed. This arrangement provides a complete mobile CO_2 welding unit with maximum flexibility for high-speed production welding. **Lincoln Electric Co. Ltd., Welwyn Garden City, Herts.**

Reader service reference No. 407

NEW Materials

Mylar has greater tensile strength

FIVE new grades of DuPont Mylar film are now available in the U.K. and these are claimed to have a greatly increased strength in the machine direction. Types 50T, 75T and 100T, thickness 0.0005in., 0.00075in. and 0.001in. respectively, have a tensile strength in the machine direction of 40,000 lb./sq. in. Types 300 NO 501 and 500 NO 501 (respectively 0.003in. and 0.005in.) have an impact strength greater than cold rolled steel strapping or fibre reinforced tapes, and break and tear strengths superior to aluminium. All films are available in widths up to 24in.

They have an unusual balance of properties which make them especially suitable in the electrical and electronic fields. Dielectric strength is 4,000 volts per mil. for 1 mil. film, they resist most chemicals and moisture and remain flexible from minus 60°C to 150°C. They can be laminated, embossed, metallised, punched, dyed or coated and lighter gauges can be vacuum formed.

Small test samples or larger samples to dimensional requirements can be supplied. **Durham Raw Materials Ltd., 1/4 Great Tower Street, London, E.C.3.**

Reader service reference No. 408

Investment material

Now available is an investment material for use in the heat treatment of Mallory 73 beryllium copper press parts. This copper develops remarkable spring properties after simple heat treatment, during which the parts may suffer slight distortion as residual stress is relieved, and therefore they must be rigidly restrained if they are to retain their shape exactly.

The investment slurry is made by adding water to a powder and investment can be done by pouring the mixture over the parts spread out in a shallow tray. The investments sets hard after a short period and holds the parts rigidly during heat treatment, but can easily be washed away afterwards. **Johnson, Matthey & Co., Ltd., 73-83 Hatton Garden, London, E.C.1.**

Reader service reference No. 409

NEW Publications

New Fabrics Incorporating Urethane Foams published by I.C.I., reviews the properties and applications and describes methods used in the manufacture of these materials.

Recent advances have made it possible to combine foam to knitted fabrics. The main function of the urethane foam is to stabilise the fabric so that it retains good shape.

Reader service reference No. 410

Printed in three languages, two brochures from Stewart Gill & Co. Ltd., deal with ovens and conveyors manufactured by them.

The industrial ovens described and illustrated include radiant heat, high velocity air circulating, conveyorised and baking ovens.

The conveyors cover overhead, enclosed, belt conveyors and other specialised handling equipment.

Reader service reference No. 411

Two leaflets from Bruce Peebles & Co. give details on their analogue computer units. This range of plug-in units can be rapidly assembled and extended to meet growing requirements and a range of auxilliary power units, nests and cabinets make for a flexible installation. Each unit plugs directly into a standard 19in. rack-mounting nest, which accepts six units and rack-mounting stabilised power supplies are available to serve up to a maximum of twelve units.

One particular unit is a sine/square wave oscillator suitable for use as an auxiliary element in the analogic solution to various problems.

The leaflets give details of overall dimensions and weights and in the case of the signal generator, an electrical specification and schematic diagram is given.

Reader service reference No. 412

A leaflet issued by The British Oxygen Co., **W. D. S. Standard Die Sets,** deals with the standardisation of presswork tooling by using these tools.

Made in a great variety of types and sizes, steel or cast iron tops and bases can be ordered in many thicknesses dependent on strength requirements. Pillar and bush lengths provide a wide choice of press stroke and shut height and variations of standard sets can be supplied.

Reader service reference No. 413

To assist customers, particularly on the Continent, a most comprehensive chart of metric equivalents, which takes all dimensions to six places of decimals, has been prepared by Sealectro Corporation. It covers from 0.00 to 25.4 millimeters in steps of 0.01 mm.

Reader service reference No. 414

READER ENQUIRY SERVICE

December 28, 1961

Please circle the reference number on the item on which you would like further details. Post to Reader Service Department, Engineering News, Drury House, Russell Street, London, W.C.2.

401	402	403	404	405
406	407	408	409	410
411	412	413	414	

BLOCK LETTERS THROUGHOUT

Your name .....

Position .....

Department .....

Company's name .....

Address .....

.....

Nature of business .....

ENGINEERING CONTRACTS

AEC BUS FLEET FOR TRINIDAD

GOVERNMENT concessions to bus operators in Trinidad and Tobago have led to proposals to put fleets of new buses on the island roads, with the result of a £400,000 order for AEC of single deck buses and chassis.

Fifty five complete buses, with bodywork by Duple Motor Bodies and five "Reliance" chassis which will be given locally built bodies are to be sent out.

☆

A mechanical arm with a 750lb. capacity and four pairs of master slave manipulators is part of the remote handling equipment for the Sizewell nuclear power station, now being built in Suffolk, ordered by English Electric from Nuclear Equipment Ltd., of Watford, Herts.

Tank farms

Expansion of Midland Silicones plant has been carried forward a step by the placing of the contract for the design and construction of tank farm additions with their pipe network.

There will be an increased storage capacity of 120,000 gallons of raw materials and products.

The contract will be carried out by the Chemical Engineering division of the Sturtevant Engineering Company Ltd., London, E.C.4, who have in hand the design and construction of a new reactor unit for Midland Silicones. The tank farm additions have to be completed by June, 1962.

☆

£130,000 worth of electrical equipment for a giant walking dragline to be built in Britain for export to Italy will be supplied by Associated Electrical Industries. AEI have provided the equipment for three similar draglines now being used in the UK.

Ransomes and Rapier Ltd., producers of the draglines, have ordered two Ward-Leonard motor-generator sets made up of two 1500h.p. synchronous motors coupled to five 660kW direct current generators.

☆

Synchronous motors from Bruce Peebles and Co., Edinburgh engineers, which were reported in the December 14 issue of Engineering News as being of 59h.p., should have been given as 5,900h.p.

FINANCE AND COMMERCE

EIA URGES TAX CHANGES

Chancellor of the Exchequer also asked to aid training

FURTHER experiments with "seniority pay" in which part of wages calculation is based on long service, development of export finance, and a review of the apprenticeship system with the introduction of small annual grants to firms carrying out training, are among suggestions put to the Chancellor of the Exchequer for consideration in his preparation of the next Finance Bill by the Engineering Industries Association.

EIA acknowledge in their suggestions to Mr. Lloyd that the main problem is to encourage an economic climate, favourable to steady increases in efficient production, and which does not produce inflation.

More effective capital allowances to encourage building and the expansion of plant on a long term basis are an important part of the suggestions. The association underlines the need for industry to be able to plan its development programmes for some years ahead.

Other measures put forward include the availability of reliable productivity indices for each sector of industry, so that wage negotiations may be related to increases in output.

Severance pay

"Severance pay" should be met through the National Insurance system and not solely on the industry and employer dismissing men.

More housing, the association points out, is needed in expanding areas.

The easing of movement by management staff by steps in connection with "portable" pension benefits is urged, along with further development of higher education, particularly in universities and colleges of technology.

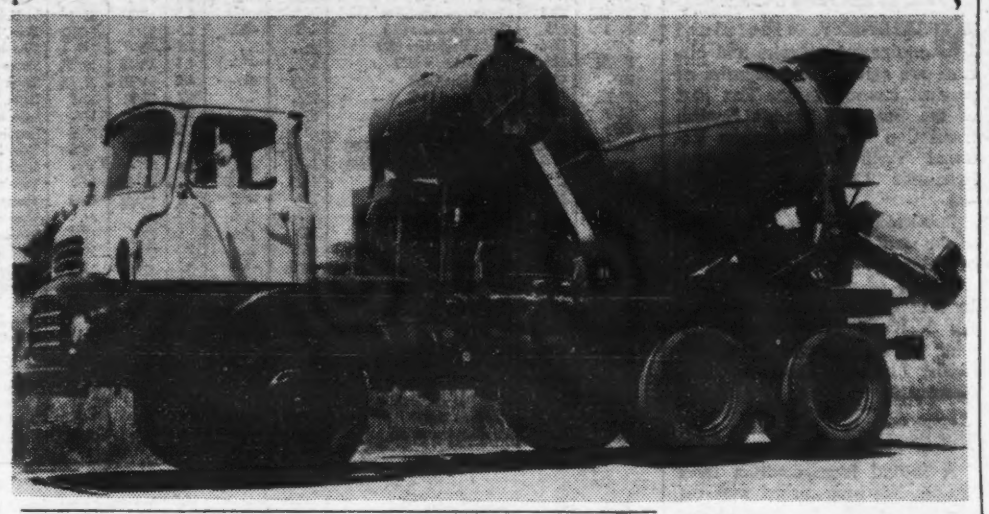
Tax exemption

On the effect of the level of profits tax on small and medium sized companies, the association points out that the plight of the smaller companies, which are most greatly reliant on self-finance, was accentuated last year by the rise in the flat rate of profits tax from 12½ to 15 per cent.

EIA would like to see exemption from tax of profits up to £5,000 and the abatement relief to be one third of the difference between the profit and £20,000.

Stressing again the importance of apprentice training, the association has reminded Mr. Lloyd of its earlier proposal that a grant of £26 should be made for each apprentice, limited perhaps to ten aprentices in any one firm and to a period of three years.

LEYLAND HELP BUILD KARIBA DAM



WORK on the strengthening of the Kariba Wall dam is being aided by four specially fitted six-wheeled vehicles built in Glasgow by Albion Motors, part of the Leyland group.

The four vehicles are Albion Reiver models (above) equipped with 125h.p. Leyland Power-Plus diesel engines and twin-driven rear axles.

Fitted with 4½cu. yard Blaw-Know concrete mixers, the Reivers have their own large water tanks so that the aggregate is loaded dry and mixed on the way from the weight batcher to the site.

Export opportunities

AUSTRALIA: Tenders will be received by the Supply and Tender Board S.A., at Gawler Place, Adelaide, for the supply and delivery of 204 sets of bogie components for pedestal type side-frame roller bearing freight bogies, one double headed grinding machine, to specification, and 816 journal sets of packaged roller bearings and adaptors to drawing. Closing date January 15, 1962; ESB 38298/61.

Power Circuit Breakers. Supply, delivery and installation at Vales Point Power station of three pole 330kV, 2,400A, 15,000MVA air blast circuit breakers single pole and three pole opening, and automatic single shot single pole and three pole reclosing and associated equipment.

Bids should be sent to the manager and secretary, Electricity Commission of New South Wales, Box 5257, GPO Sydney, New South Wales, quoting Tender No. 1213. Closing date February 5, 1962; ESB 38250/61.

ETHIOPIA: 2,750 metres of cable in standard unit lengths of 230 to 250 metres. Composite armoured cable in these pairs;

(a) Four screened pairs in the middle for radio programme transmissions. Diameter 1.3mm.

(b) 400 pairs arranged in 100-groups (unit type) to be used for trunk lines between Filwoha and Central Exchanges. Diameter 0.9mm.

(c) One star-quad for 12-channel carrier system in the centre of each 100 group unit. Diameter 1.3mm.

Bids should be sent to the Imperial Board of Telecommunications of Ethiopia, PO Box 1047, Addis Ababa, Ethiopia. Closing date January 15, 1962; ESB 38289/61.

INDIA: Pumps, Drills and Accessories.

(a) 10 Diamond Core Drills, Skid mounted capacity 650/750ft. NX with NW rods.

(b) 10 as above, capacity 1,400/1,500ft. NX with NW rods.

(c) 25 as above capacity 2,300/2,500ft. NX with NX Wireline Rods.

(d) 45 Mud Pumps capacity 35g.p.m at 400/500 PSI and accessories.

(e) Five as above, heavy duty 50g.p.m. at 400 PSI and accessories.

(f) 10 as above, heavy duty at 60g.p.m. at 500/600 PSI and accessories.

(g) 45 Centrifugal supply pumps capacity approx. 100g.p.m. for 300ft. head.

(h) General operating equipment including hoisting tools, coring and drilling accessories.

Bids should be sent to the National Coal Development Corporation Ltd., Office of the chief purchase officer, "Darbhanga House", Ranchi, quoting Tender No. CPO / M / CG / Drills / 667-R. Closing date February 15, 1962; ESB 38540/61.

Inquiries should go to the Export Services Branch, Board of Trade, Lacon House, Theobalds Road, W.C.1, before dates given. References (ESB) should be quoted.

NEW Companies

B. & H. (Heating) Ltd., 11 Peter Street, Manchester 2. To carry on the business of heating engineers. Nominal capital £5,000.

Boiler & Pipework Co. Ltd., 15 Reeves Road, Kings Heath, Birmingham 14. To take over the business known as "The Boiler & Pipework Co." carried on at Kings Heath, Birmingham. Nominal capital £100.

Dove Machine Tool Co. Ltd., 1-3 Vaughton Street South, Birmingham 12. Nominal capital £1,000.

Econheat Ltd., Pretoria Works, Carlisle Street, Bradford 8. To carry on the business of heating and general engineers. Nominal capital £3,000.

Halston Products (Walsall) Ltd., Bentley Lane, Walsall, Staffs. To carry on the business of bolt manufacturers. Nominal capital £2,000.

Frank Costin Ltd. To carry on the business of aeronautical, marine, mechanical and general engineers. Nominal capital £100.

Raeburn Engineering Co. Ltd., 18 High Street, Harborne, Birmingham 17. To carry on the business of general engineers. Nominal capital £1,000.

Aircar Ltd., 29 Mincing Lane, E.C.3. To carry on the business of engineering surveyors, aviation and marine consultants. Nominal capital £100.

James Pollard & Sons (Worsthorne) Ltd., Gorple Mill, Worsthorne, Burnley, Lancs. To carry on the business of metal merchants, etc. Nominal capital £5,000.

These particulars are selected from the daily Jordan's Register, published by Jordan & Sons Ltd., 116 Chancery Lane, London, W.C.2.

THOSE TWO BIG BIDS SET THE CITY TALKING

WEEK IN THE CITY

BY OUR CITY EDITOR

ALTHOUGH the volume of business tended to slacken, London stock markets held quite firm in pre-Christmas trading, with interest stirred by the disclosure of the impending ICI bid for Courtaulds.

Another talking-point has been the joint bid for Fairey by Bristol and Westland Aircraft.

The approach to Fairey is unusual in that Bristol and Westland are each offering two of their shares, priced at 15s. 10½d. and 16s. 6d. respectively before the announcement, for every three 10s. Fairey Ordinaries.

This values Fairey shares at about 21s. 7d. each, against 14s. shortly before the bid was made.

The value of the offer falls well below Fairey's apparent asset value and has the disadvantage of being all in shares, without a cash alternative.

Low profit

But Fairey's recent profit record has been far from impressive and the trading outlook is still obscure.

News of the bid for Fairey is bound to touch off further speculation as to how long Handley Page will be able to continue as an independent company.

Another point of interest in pre-Christmas stock markets was the disclosure that the Government has accepted, in principle, the idea of a decimal currency for Britain, and that a committee of inquiry has been formed to investigate how the decision could be implemented.

Shares of Averys, Lamson Industries and ICT, among others, attracted support on the assumption that a change would involve more business for them.

Gains tax

As the old year ends, the outlook for stock markets is unusually difficult to appraise as so much will depend on Government policy and the trend of international affairs.

There is still the threat of a capital gains tax to contend with, but the Chancellor would hardly be so rash as to introduce a measure so severe as to stifle genuine risk investment.

The passing of the Trustees Investment Bill has provided an important new source of support for equity stocks, and the full effects of this measure have yet to be seen.

TRADE AGREEMENTS

ELLIOTT BUY UP PALATINE

ELLIOTT Brothers (London) have bought the share capital of a small specialist engineering company, Palatine (Surbiton) Ltd., who have established a position as a supplier to companies of the Elliott-Automation group.

Chief among the companies for whom Palatine have worked have been the Rotameter Manufacturing company and Elliott Nucleonics.

☆

A new company to control its marketing throughout Australia and New Zealand has been set up by the Firth Cleveland group.

Established member companies, at Ballarat, Victoria, and Sydney, will become subsidiaries of the new organisation—Firth Cleveland (Australasia) Pty., Ltd.

The Ballarat company produce and sell self-locking nuts, hand tools and power tool attachments and also cultivators and Firth Cleveland pumps.

☆

Arrangements now being carried out in Canada by G. and J. Weir Holdings Ltd. will, if successful, lead to their subsidiary company Peacock Brothers Ltd. becoming a wholly owned member of the group.

Peacock have agreed to sell their Nordstrom valve plant in Quebec to Rockwell Manufacturing of Canada, a subsidiary of the Rockwell Manufacturing company of Pittsburg, USA.

After the transfer it is intended that Peacock shall continue as a contract stocking jobber for Rockwell-Nordstrom valves in Canada. The sale of the valve plant will not affect Peacock's activities in a wide range of engineering products, some of them sold for UK engineering companies.

G. and J. Weir's arrangements with Rockwell include the acquisition at the end of the year of Rockwell's minority holding of Peacock shares by the issue to Rockwell of 243,920 ordinary shares in G. and J. Weir Holdings.

☆

A long established Newcastle civil engineering contracting firm, Brims and Co., has been bought for cash by Swan, Hunter and Wigham Richardson, shipbuilders.

This step gives the Swan, Hunter concern a degree of diversification into the civil engineering field and will allow for additional expansion in the business of the new wholly owned subsidiary.

Brim's existing directors remain, and Mr. E. J. Hunter, chairman of Swan, Hunter becomes chairman of the new acquisition.

State steel —last few

THREE quarters of the employment, steel production and sales of products of the steel industry subsidiaries in which the Iron and Steel Holding and Realisation Agency still has direct holdings are accounted for by the Richard Thomas and Baldwins company.

Between July, 1953, and September, 1960, the Realisation Agency reduced the number of concerns in which it held direct holdings from 71 to eight.

The eighth annual report of ISHRA recalls that during the year the agency sold privately one subsidiary company and the debenture stocks of the companies whose share capital had been previously sold.

There are now only seven subsidiaries in which ISHRA has direct holdings.

The cumulative gross realisation up to September 30, was £336.9 million, of which £204.7 million came from 50 companies where the whole of the agency's holding was sold.

FORD'S NORTH WEST WORKS

MOST of the steelwork at Ford's new £28 million factory at Halewood, on Merseyside, has now been erected. Considerable progress has been made with the installation of the basic manufacturing equipment.

It is expected that work on the 362 acre site will be complete by the end of 1962 and that the factory will then be ready for production.

So far some 750,000 sq.-ft. of floor space have been roofed and 22,000 tons of steelwork for the body assembly and final assembly buildings placed in position.

GAS TUBE PRICES TO RISE

2p.c. up from January due to material increase

FROM January 1, the price of gas list steel tubes and tubulars sold in the home market is to increase by about 2 per cent. This stems from the increased price of hot-rolled carbon steel strip, announced in November, states the Iron and Steel Board.

Last year, about 300,000 tons of gas list tubes were sold in the UK and about 180,000 tons were exported. Used to convey gas, water and steam, the tubes vary in size from 1/8 to 6in. diameter.

Solid drawn tubes are not affected by these changes.

ELECTRIC HOME GOODS IMPROVE

HOME sales of domestic electrical appliances, rising by almost five per cent in the first nine months of the year despite hire purchase restrictions and the ten per cent purchase tax surcharge, give a clear indication of the strength of the latent demand.

Deliveries of appliances, other than refrigerators, to the home market from January to September were worth £83.5 million (against £79.7 million in the first nine months of 1960).

Export deliveries rose by 7.6 per cent and at the same time imports dropped by 37 per cent.

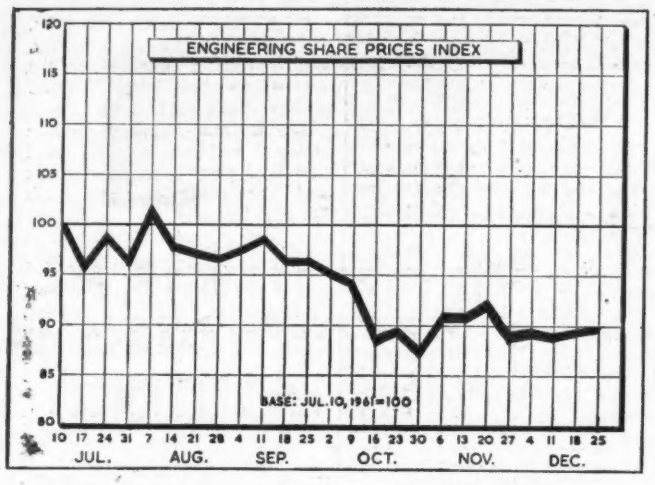
BEAMA (The British Electrical Appliance Manufacturers' Association) describes the improvement in home sales as "a disappointing rate of increase" but adds that it must be viewed against the current economic climate.

Core sand cheaper

MOULDING sand, used mainly for non-ferrous castings, is to be reduced in price by £5 to £7 10s. a ton.

This cut will apply to deliveries of one, five, and ten lots of Petro Bond ready-mixed moulding sand.

Petro Bond Sand is distributed by F. W. Berk and Co. who also sell a related sand binder to foundries who mill sand, oil, and alcohol with the binder in their own plant. This sand is used for such products as impellers, pump housings and bearings.



EEC tariff translated

MACHINERY, electrical equipment, vehicles and aircraft are among the categories of product covered in the first part of the Board of Trade's English translation of the Common External Tariff of the European Economic Community (HMSO, 4s.)

Publication of the other parts of the tariff is expected by the end of February.

Copies of the translation may be seen at the regional offices of the Board of Trade in Birmingham, Bristol, Cardiff, Glasgow, Leeds, London, Manchester, and Newcastle.

RIDING ON AIR

A second large contract from Sweden has been placed with the Dunlop company for Pneuride air suspensions to be used on buses.

The Swedish Scania-Vabis company incorporate air suspension to lessen the transmission of shock and vibration from road surface to chassis, reducing maintenance and prolonging the life of the bus, and also to increase the degree of passenger comfort.

FINANCE AND COMMERCE

ENGINEERING NEWS SHARE PRICES TABLE

1961 High	1961 Low	Stock	Dec. 21	Ch'ge	Y'ld p.c.	1961 High	1961 Low	Stock	Dec. 21	Ch'ge	Y'ld p.c.
47/9	29/-	Allen, Edgar (£1)	29/-	–9d.	9.1	57/-	44/9	Lister, R.A. (£1)	52/-	–6d.	5.5
43/-	24/9	Allen, W. H. (£1)	25/9	...	7.6	51/9	36/-	Mather & Platt (£1)	36/6	+3d.	5.9
77/-	58/6	Angus, George (£1)	67/6	...	5.9	67/-	46/-	Metal Industries (£1)	54/-	–1/-	5.5
31/10½	19/-	A.P.V. (10/)	29/6	...	3.7	71/3	53/4½	Morgan Crucible (£1)	56/9	...	4.8
14/1½	8/10½	Asquith Machine Tool (5/)	10/-	...	2.4	31/-	16/4½	Morris, Herbert (10/)	16/4½	–3d.	8.3
48/6	29/-	Assoc. Electrical Ind. (£1)	29/-	+6d.	10.2	52/-	37/3	Murex (£1)	40/-	–6d.	6.4
16/5	11/8	Assoc. Engineering (5/)	13/-	–6d.	5.1	49/6	40/6	Neepsend Steel (5/)	40/9	–3d.	6.0
110/-	83/-	Averys (£1)	97/3	+1/-	3.0	31/6	20/3	Newton Chambers (5/)	20/3	+9d.	4.8
36/9	20/-	Babcock & Wilcox (£1)	20/3	–1/-	...	41/3	20/7½	Parkinson Cowan (£1)	20/7½	...	8.4
59/6	40/6	Baker Perkins (£1)	44/6	+1½d.	5.0	72/9	47/-	Parsons, C. A. (£1)	50/9	...	4.9
9/7½	5/10½	Beyer Peacock (5/)	6/7½	...	8.7	40/3	38/-	Plessey (10/)	43/3	–6d.	3.4
77/-	45/-	Birfield (£1)	70/3	+1/9	2.8	33/-	16/-	Pressed Steel (5/)	17/3	...	...
102/10½	60/6	Birmid Industries (£1)	61/6	...	6.4	25/3	19/9	Qualcast (5/)	20/10½	–7½d.	4.2
36/10½	18/6	Birmingham Small Arms (10/)	17/9	+9d.	6.5	38/1½	22/3	Radiation (£1)	23/3	...	8.4
45/6	33/6	Brockhouse, James (£1)	43/10½	+6d.	5.6	22/6	14/-	Ransome & Marles (5/)	15/9	+3d.	4.3
28/9	21/1½	Broom & Wade (5/)	21/4½	...	5.3	28/6	22/6	Ransomes, Sims & Jeffs (£1)	25/9	+1/-	5.6
42/6	29/9	Brotherhood, Peter (10/)	31/3	...	7.8	50/6	34/6	Renold Chains (£1)	45/-	+3d.	4.4
48/9	30/4½	Brown, John (£1)	37/3	+2/1½	5.8	52/3	38/-	Reyrolle, A. (£1)	43/9	–6d	4.4
8/6	4/3	Cammell Laird (5/)	4/6	–3d.	...	9/1½	3/4½	Richardsons Westgarth (10/)	3/9	...	...
39/6	24/3	Carrier Engineering (5/)	24/3	–6d.	5.0	9/3	4/3	Roberts, Charles (5/)	5/3	–6d.	...
54/3	35/6	Clarke Chapman (£1)	36/6	...	7.4	48/6	35/6	Rolls-Royce (£1)	36/-	+1½d.	6.1
14/9	9/6	Cohen, George (5/)	9/6	...	6.5	32/6	20/-	Ruston & Hornsby (£1)	19/9	+3d.	8.9
33/10½	21/8	Coventry Gauge & Tool (10/)	31/6	+6d.	4.5	19/3	12/3	Serck (5/)	13/3	...	4.6
12/3	7/3	Craven Brothers (5/)	8/3	–3d.	5.0	23/9	8/7½	Shaw, Francis (4/)	8/7½	–7½d.	...
24/-	17/6	Crofts Engineers (5/)	21/-	...	3.9	12/-	7/9	Sheepbridge Engrg. (5/)	8/9	+3d.	8.1
39/7½	30/-	Davy-Ashmore (5/)	31/-	–1/-	4.3	32/4½	19/1½	Simms Motor (5/)	24/-	–3d.	3.6
70/-	44/3	De La Rue (10/)	52/9	+1/-	4.2	44/1½	29/7½	Simon Engineering (5/)	30/9	+1½d.	4.4
27/7½	19/9	Delta Metal (5/)	21/-	...	4.7	23/9	13/9	Smith, S. & Sons (4/)	16/3	...	4.9
68/9	50/-	Desoutter (5/)	63/9	...	2.7	15/3	11/-	Solar Industries (5/)	12/3	+6d.	7.0
41/3	29/6	Dowty Group (10/)	30/3	–3d.	5.0	45/7½	22/6	Staveley Industries (£1)	27/6	+6d.	7.8
32/10½	22/4½	Edwards High Vacuum (4/)	31/7½	...	1.9	32/6	18/6	Steel & Co. (5/)	32/3	+10½d.	3.4
52/-	35/3	Elec. & Musical Ind. (10/)	44/6	+3d.	3.9	67/-	38/-	Stone-Platt Ind. (£1)	43/3	...	...
40/3	25/9	Elliott-Automation (5/)	44/6	+1/6	1.4	20/4½	14/-	Tecalemit (5/)	15/6	...	5.7
40/6	23/-	English Electric (£1)	23/-	–6d.	8.6	17/4½	10/6	Thompson, John (5/)	13/-	+3d.	1.8
37/3	21/6	Firth Cleveland (4/)	23/10½	+6d.	5.4	7/-	4/-	Thornycroft, John (4/)	4/3	...	8.1
39/6	24/3	G.E.C. (£1)	24/-	+9d.	8.5	17/6	11/6	Toledo Woodhead (4/)	15/6	...	5.1
65/-	46/3	General Refractories (10/)	47/3	...	5.2	85/6	55/-	Tube Investments (£1)	61/6	–1/3	4.5
66/6	41/3	Glenfield & Kennedy (£1)	41/3	–5/-	9.7	38/4½	25/6	Vickers (£1)	27/3	–1½d.	7.2
108/7½	70/-	Guest, Keen & Nettlefold (£1)	76/-	+1/3	4.2	...	60/7½	Walmsley (Bury) (£1)	60/7½	–1/1½	3.6
48/7½	26/6	Haden, G. N. (5/)	29/9	...	3.2	84/6	59/-	Ward, Thos. W. (£1)	59/6	+6d.	4.5
16/6	12/1½	Hall-Thermotank (5/)	12/7½	+1½d.	4.3	17/9	10/1½	Weir, G. & J. (5/)	12/4½	+1½d.	7.1
24/-	13/4½	Harland & Wolff (£1)	14/-	–3d.	7.0	47/6	27/3	Wellman Smith Owen (5/)	27/9	+1/1½	3.9
33/3	21/6	Hawker Siddeley (£1)	22/1½	–7½d.	9.5	14/1½	9/9	West, Allen (5/-)	9/9	...	6.7
31/-	19/-	Head Wrightson (5/)	20/6	+6d.	3.8	46/3	23/6	Westinghouse Brake (£1)	23/-	...	7.9
79/9	51/6	Herbert, Alfred (£1)	64/-	+3d.	4.3	36/6	18/-	Whessoe (5/)	18/-	...	7.4
95/6	66/3	Hick Hargreaves (£1)	66/3	–3/9	6.0	17/-	12/-	Wilmot-Breeden (5/)	14/4½	–1½d.	3.8
138/9	101/3	Hopkinsons (£1)	113/9	+3/1½	4.8	30/-	18/9	Woodall-Duckham (5/)	18/3	...	5.6
25/-	18/6	Howden, James (5/)	19/-	–3d.	6.4	64/9	44/6	Worthington-Simpson (10/)	48/-	+6d.	5.1
33/9	22/7½	International Combus (5/)	25/7½	–3d.	5.7						
		IRON AND STEEL									
43/6	25/7½	Brown Bayley (10/)	37/6	...	4.2	42/-	22/7½	South Durham Steel (£1)	22/4½	...	9.0
81/3	46/1½	Colvilles (£1)	46/1½	–6d.	7.1	47/8¼	29/10½	Steel Co. of Wales (£1)	29/10½	+7½d	6.7
32/3	17/1½	Consett Iron (£1)	18/-	+4½d.	...	57/4½	36/7½	Stewarts & Lloyds (£1)	37/1½	+3d.	8.3
43/7½	23/4½	Dorman Long (£1)	24/6	+1/1½	8.3	68/7½	42/1½	John Summers (£1)	43/6	–4½d.	6.9
55/1½	37/-	Firth & Brown (£1)	45/10½	+1/10½	5.5	55/7½	38/-	United Steel Cos. (£1)	38/7½	–3d.	6.7
49/10½	31/1½	Lancashire Steel (£1)	31/3	...	6.9	63/6	41/-	Whitehead Iron & Steel (£1)	41/-	–1/9	7.3

The companies whose share prices are quoted in the Engineering table and which form the basis of the Index give a balanced and comprehensive study of the engineering industry. Prices quoted are those at the start of the week. Due adjustments for Rights and Scrip issues are made. The Index figure is calculated on a National Cash Register Company computer. Prices in the Iron and Steel sections are not included in the Index.

ENGINEERING NEWS Appointments Service....

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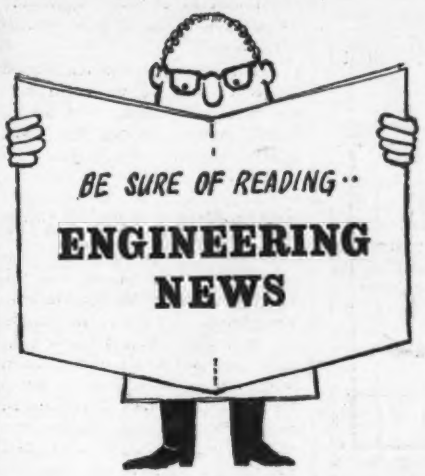

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DSIR CONTRACT SPEEDS RESEARCH

Extra designers and engineers drafted onto gear grinding project

MORE designers and development engineers are being drafted to research on a large gear grinding machine in an attempt to complete work within three years.

This follows a £200,000 Government contract awarded to Craven Brothers (Manchester) announced in last week's Engineering News.

Development of machine tools of increasing precision for the manufacture of fast-running marine reduction gears has been in progress for a number of years by various organisations.

The aim is to eliminate the "scream" frequently emitted by high-speed turbine gears.

Some idea of the accuracy required in these gears can be appreciated in that tooth speeds up to 350 ft./sec. are now frequently used.

Craven Brothers have played a considerable part in the development of gear hobbing machines to meet this demand, both in marine applications and commercial gear generation.

Their large gear hobbing machines are built with capacities up to 21ft. diameter. They operate on the heavy-load fixed table and moving column principle.

The machines are capable of generating single and double helical reduction gears.

Extreme accuracy

Accuracy is the keynote and this is especially true with regard to the master wormwheel and worm for turning the hobbing machine table and the cutter feed screw.

Manufacture of the large master wormwheel was undertaken by machining it as accurately as possible, measuring tooth pitch to a high degree of accuracy, and incorporating a compensating track and follower for correcting errors by slight movements of the hob.

Master worm and feed screw were also made to a high degree of accuracy, and they were manufactured in temperatures controlled to within ½ degree F.

Gear cutting on these precise machines must, in fact, be carried out in similar temperature controlled conditions to realise their inherent accuracy.

Craven recently developed an experimental machine for grinding helical gears, which demonstrates a simplified approach to the problem, but the machine to be developed for D.S.I.R. will be much more accurate.

Combined action

On the experimental machine a grinding wheel is reciprocated across a straight generator line, and this action combined with a spiralling control, comprising simultaneous vertical feed of the grinding head on the column in relation to the rotary feed of the worktable, produces the necessary involute helicoidal form of tooth flank.

Electrical control for automatic cycle operation is embodied in a desk-type panel, including tachometers for all main driving motors.

The company celebrated its centenary in 1953. It has specialised in design and manufacture of custom - built heavy precision machine tools of all descriptions.

Possessing its own foundry and pattern shop, castings of over 40 tons can be produced.

Recent additions of major importance to the factory include a temperature-controlled workshop 150ft. x 50ft. and over 38ft. high for manufacture of large high-precision machine tools.

by

C. W. KENWARD

Machine Tool Correspondent

ADMIRALTY WAVE TANK LEADS THE WORLD

AN experimental manoeuvring tank incorporating a rotating arm for towing models and a plant for producing wave patterns was opened by the Duke of Edinburgh at the Admiralty Experiment Works, Haslar, last week.

The 400 x 200ft. tank, with a 20ft. depth provides British naval designers with ship building facilities superior to any in the world.

It will be possible to obtain better performance figures for a specific design, since it is an easy task to carry out modifications based on test data.

Models weighing up to 2,000lb. can be fixed to a central rotating arm (provided by Firth Brown) and towed at any radius between 20 and 90ft., at angular speeds from 0.01 to 0.6 radians/sec.

The arm is cantilevered from the outer hub of a centre post which is bolted down to a central island independent of the main tank structure.

The 18ft. high hub rotates on two Timkin 6½ft. internal diameter taper roller bearings, 8ft. apart and preloading as a pair to minimise deflections.

Special gearbox

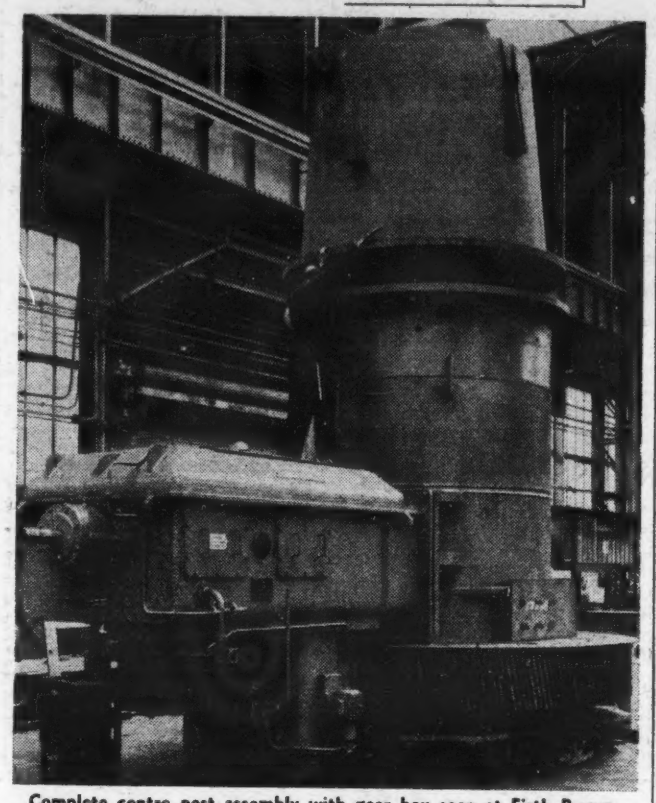
The king-post accommodates a slip ring assembly with 162 mercury and 72 brass rings to carry cables ashore.

The counterweight section is an all - welded tubular construction like the main arm, and carries the drive as well as the counterbalances.

Power is supplied by a 480h.p. d.c. motor running at 1,380r.p.m. A special gearbox gives an overall drive ratio of 240:1 and a 14ft. diameter gear attached to the king-post engages the pinion of its low speed shaft.

The test model is attached by struts to a turntable on a travelling carriage suspended from the underside of the arm.

The carriage can be raised by hydraulic jacks and locked in the required position by adjustable pins locating in sockets.



Complete centre post assembly with gear box seen at Firth Brown works.

The wave-making installation is designed to generate patterns scaled down to meet conditions found on the world's oceans.

The system uses ten wedge shaped plungers, built by Head Wrightson, each 40ft. long. One group of five is arranged along one end of the tank and the second group along an adjacent side.

Waves range

The end plungers will create waves 5ft. long x 6in. high, up to 40ft. x 2ft. high.

For the side set, the maximum is 20ft. x 1ft.

The oil hydraulic system which operates the plungers was designed by Keelavite Hydraulics of Coventry. The electronic control equipment was sub-contracted to AEI, Leicester.

Double - acting hydraulic cylinders actuate the wedges up and down guide rails, each cylinder having its own pump and control system. Two further stabilising cylinders maintain the wedge horizontally.

The plungers, with their universal coupling connections, will operate independently, simultaneously, or in selected grouping.

Three circuits

The hydraulic system uses three circuits: boost, servo and main operating. Boost and servo systems are powered by Keelavite heavy duty pumps and the main circuit employs a Lucas swash pump.

The accuracy which the electronic control systems provides is conveyed to the system through a Keelavite electro-hydraulic servo valve.

This consists of a rotary torque motor driving a pilot valve which provides one stage of hydraulic amplification to control the second stage piston.

The output of this valve is coupled to cylinders controlling the angle of tilt of the swash plate of the main pump, the amount and duration of flow in any one direction determining the amplitude and frequency of the waves generated by the plunger.

DAIMLER TURN TO BOATS

RECENTLY the Daimler Co. announced that they are producing a 2½ litre V8 marine petrol engine giving high power output with low fuel consumption.

It has been developed from their 125m.p.h. SP 250 sports car engine, and the marine unit has been proved in test bench and service trials.

Principal features of the unit are a five-bearing crankshaft balanced statically and dynamically, aluminium cylinder heads, hemispherical combustion chambers, and overhead valves with short pushrods.

'Oversquare'

The engine is "oversquare" with a bore of 76.20mm and stroke of 69.85mm. Capacity is 2,549 cc. with a power output of 140b.h.p. at 5,800r.p.m.

Cooling is on the closed circuit principle with water - cooled exhaust manifolds. Oil-cooling is also provided. The engine is supplied complete with Warner "Velvet Drive" forward and reverse transmission.

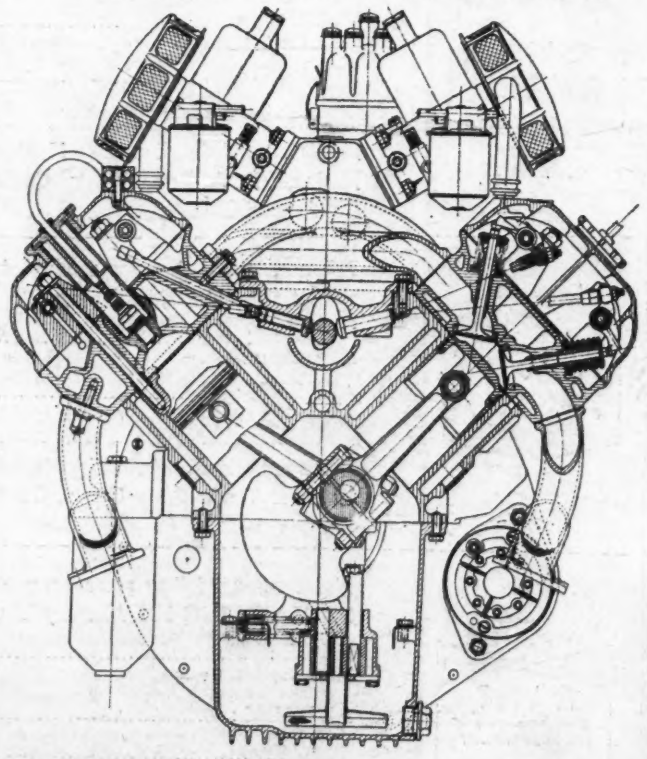


Diagram of the Daimler V8 marine petrol engine — high power output with low fuel consumption.

Automatic brake for mine cars

THE mine car Hydrabrake, developed by Strachan and Henshaw, of Bristol, provides a simple, entirely automatic means of controlling the speed of free-running mine cars on gradients.

It is bolted between sleepers, directly to the inside of the rail web, and the braking on a given circuit can be adjusted by adding or removing some of the units.

The device comprises a pivoted arm, with a pad at each end, controlled by a double headed piston working in opposed horizontal cylinders filled with oil.

When a mine car passes through the brake, the wheel flange depresses the leading pad, causing the piston to move forward in the cylinder and bringing the trailing pad into position.

This is then depressed, moving the piston back and setting the arm ready for the next wheel.

An orifice fitted into a passage connecting the two cylinders allows oil to pass from one cylinder to the other, giving the normal characteristics of a dashpot. Therefore, as speed increases, the braking force exerted on the car increases.

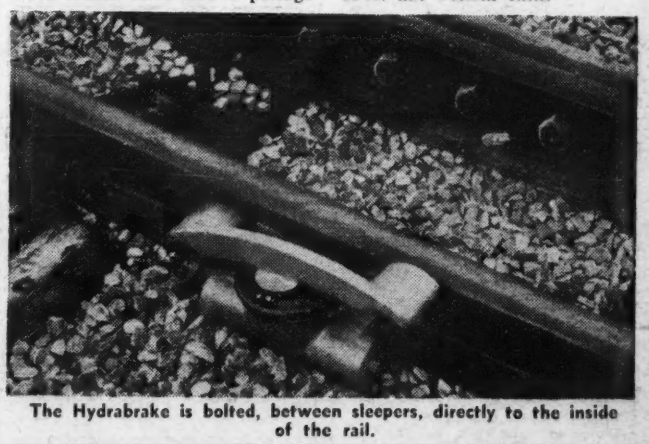
Two other passages are fitted with pressure relief valves which open to release oil to the other end of the piston if the car speed is high enough to cause overpressure.

In this way, lifting of the car wheel is prevented and the brake still absorbs the designed amount of energy.

A further passage in the piston connects the cylinders with an oil reservoir.

This is fitted with automatic refill valves to ensure that the pressure system is always completely filled with oil.

The unit is completely sealed, requiring negligible maintenance and no adjustment, and is designed for fitting to 35, 50, or 60 lb. flat bottom rails.



The Hydrabrake is bolted, between sleepers, directly to the inside of the rail.

LATE NEWS

TEMple Bar 3422

Tempered Group, Sheffield manufacturers of high-grade coil springs and presswork, agreed on full exchange of technical knowledge with Associated Spring Corporation, of Connecticut, U.S.A.

● From front page

1962 prospects

ment at Ferranti, said: "In 1961 we had an encouraging success with our giant Atlas computer and the immediate future promises even greater developments."

Mr. John Ayres, a director of Simms Motor and Electronics Corporation, and managing director of Simms Motor Units, said: "We believe 1962 will be an even brighter year than 1961 for our group of companies.

"During 1961 Simms Motor Units have been involved in a change-over period resulting from the acquisition, equipping and putting into operation of our new factory at Ponders End."

Nickel abundant

An executive at the International Nickel Co. (Mond), said: "There is now an abundance of nickel for the first time since the war. The International Nickel Co. of Canada, has with the opening of the Thompson mine in Manitoba provided an additional annual potential of 75 million lb.

"What we shall now be able to do is to supply consumers with the types of nickel required and this makes the prospect for 1962 very bright."

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